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A photograph of a woman with short dark hair and glasses, wearing a yellow and red patterned top, sitting at a desk in a server room. She is looking towards the camera. In the background, there are server racks and a computer monitor.

► Digitalization of national TVET and skills systems: Harnessing technology to support LLL

An enquiry and action framework

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Digitalization of national TVET and skills systems: Harnessing technology to support LLL

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► Foreword

The rapid development of digital technologies creates new opportunities and challenges for us all.

Digitalization is changing the nature of occupations and the skills required in different economic activities. New job roles and forms of work organization place fresh demands on enterprise HR practices, affecting talent management and staff development practices in all firms.

The increasing use of digital technologies is also driving change in the tools and modalities of learning, assessment and certification along with the provision of career guidance, job matching and labour market services.

In this context, national Technical and Vocational Education and Training (TVET) and skills systems have both external and internal pressures. First, they have to respond to the external demand for new skills from our increasingly digital society and enterprises, and secondly, as other sectors do, they themselves have to engage in digital transformation and the challenges this presents to their institutions, staff and learners.

TVET and skills systems have a special obligation to ensure that in the process of digitalization, the uneven access to equipment, tools and skills that exist cannot be allowed to increase marginalization of disadvantaged groups and to widen the digital divide.

The considerable challenges presented by the COVID-19 pandemic have brought the issue of digitalization to the fore. All forms of education and training have been affected, particularly in low-income countries and amongst the most vulnerable social groups. As a result of the great efforts of public authorities, the private sector and civil society, innovative solutions were developed as the emergency response evolved. From these arrangements have emerged promising practices and the development of more flexible learning and assessment options, including high-tech, low-tech and even no-tech solutions, dictated by local contexts and developed as the crisis unfolded.

Although TVET and skills systems rapidly adapted to the COVID learning crisis and accelerated the introduction of digital technologies, recent ILO and UNESCO research illustrates the need for integrated and coherent national digitalization strategies, developed through social dialogue, that address both the demand and supply sides of skills systems. Such strategies should take a systemic perspective to digitalization and consider the potential role digital technologies can play across all aspects of a skill system, and not just on teaching and learning which has naturally been the priority during COVID.

This guide has been developed to support ILO constituents take a more strategic approach to the digitalization of national TVET and skills systems. It presents a system level digitalization framework, provides an overview of the main issues surrounding digitalization across all aspects of skills development, gives a useful introduction to key frameworks and tools that support digitalization, and presents numerous concrete examples of national initiatives from around the world.

As highlighted in the global call to action for a human-centred recovery from COVID-19, made during the 2021 International Labour Conference, it is critical for ILO constituents to engage in digital transitions to facilitate lifelong learning for all individuals, to leverage technologies for digital inclusion and to bridge the digital divide for marginalized populations.

I commend this guide to you as a useful resource for this purpose and congratulate the Skills team for its development.

Srinivas B. Reddy

Chief, Skills and Employability Branch, ILO

► Acknowledgements

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The report was prepared by members of the Skills Development Policies and Systems Team of the ILO Skills Branch, namely: Paul Comyn (Senior Skills and Employability Specialist), Karine Sonigo (Skills Digitalization Specialist), and Pedro Moreno da Fonseca (Technical Specialist on Lifelong Learning), with research support from Jongwoo Lim (Online and Distance Learning consultant). The report benefited from helpful comments and suggestions from the following colleagues: Christine Hofmann (Social Inclusion Skills & Employability Specialist), Olga Strietska-Ilina (Skills Anticipation for Future labour Markets Senior Skills & Employability Specialist), Hae Kyeung Chun (Skills Anticipation for Future labour Markets Jr. Professional Officer), Ashwani Aggarwal (WBL, Apprenticeship & RPL Senior Skills & Employability Specialist), and Patrick Daru (Head of Operations of the Global Programme on Skills and Lifelong Learning).

Last but not least, the launch of the report would not have happened without efficient administrative support from ILO staff Axelle De Miller and Jelena Keser.

► What does this report aim to achieve?

This report sets out an analytical framework and descriptors for the development of national strategies for the digitalization of TVET and skills systems. It includes:

- a description of the key components of national skills systems and the key processes associated with them;
- an overview of the digital TVET context with examples of initiatives at the national, sectoral and local levels from around the world;
- a collection of relevant and adaptable digitalization models and practical guides; and
- a set of initial implementation guidelines for digitalization.

The analysis is based on a conceptual framework - Building Blocks of Skills Development Systems – where the 'building blocks' identify the five high-level functions of a skills development system. These are:

- Policies, Structures and Resources for Skills Development.
- Anticipating, Planning and Monitoring Skills Development.
- Developing, Certifying and Recognizing Skills.
- Improving Access to Skills Development and the Labour Market for All.
- Skills for Employability, Decent Work and Productivity in the Workplace.

For each of these five building blocks, the framework includes summaries of the key issues and challenges related to the digitalization of that area of a skills for consistency. In addition, where opportunities to improve access and learning outcomes through digitalization have emerged, these have also been highlighted. Finally, for each building block, recommendations are provided to guide the digitalization of inclusive TVET and national skills systems.

In reviewing models and country examples, the basic or sometimes legacy approaches to digitization of TVET and national skills systems have been described to provide examples for countries who are still early in their digital journey, but at the same time, innovative models and leading-edge practices have been identified which can illuminate the next generation of tools and services and offer inspiration for those countries further along their digital journey.

Although there is very little firm comparative data on “what works” in implementing digitalization and managing its transformative impact on TVET and skills systems, we have ventured in places to highlight initiatives and approaches which have special promise. This is especially true of the summary section on building capability, which presents a number of provocative ideas about workforce training in TVET.

► How to navigate this report

The report is divided into ten main sections.

We have used the five building blocks of skills development systems to structure the framework and consider for each of them: key areas for digitalization, implementation guidelines, country examples and existing models and guides. Even though all the five building blocks are all closely related and interconnected, it is essential to focus on the key areas in each of them separately so that the particular issues and challenges in the digitalization process are considered fully.

While the report is primarily aimed at leaders, policy makers, planners and managers in TVET and skills systems, many of the guidelines can also inform complementary innovation strategies at regional, provincial or organizational/institutional levels as they can be adapted to local realities and possibilities.

To make it easy for you to navigate through the Framework, we have created a direct access map of its content below:

- If you wish to know more on the context and landscape of the digital transition of national TVET and skills systems, as well as understand what digitalization means, please read **section 1 & 2**.
- If you are interested in getting to better understand how we have described a national skills system, and go through the description of its 5 main components, or “building blocks”, please read **section 3**.
- If you would like to look into the main areas of digitalization of the governance and policies of a national skills system (Building Block 1), please read **section 4**.
- If you are interested in understanding how technology and digitalization can have an impact on the way we anticipate, plan and monitor skills development in labour market planning (Building Block 2), please refer to **section 5**.
- If you are willing to look specifically at the way digitalization can affect training and assessment, and the impacts it can have on how we develop, certify and recognize skills (Building Block 3), please read **section 6**.
- If you are interested in going through the main challenges that digitalization needs to address, and how, in order to improve access to skills development and the labour market for marginalized groups (Building Block 4), refer to **section 7**.
- If you would like to identify key areas for digitalization and the development of skills for employability, decent work and productivity (Building Block 5), please read **section 8**.
- If you are interested in knowing more about the main capability and capacity building challenges of the digital transition in national TVET and skills systems, please go to **section 9**.
- If you would like to read the key messages of the report and the digitalization framework, please read **section 10**.

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► Abbreviations and Acronyms

CEDEFOP	European Centre for the Development of Vocational Training
ETF	European Training Foundation
ILO	International Labour Organization
IT	Information technology
ICT	Information & Communications Technology
ITU	International Telecommunications Union
LCMS	Learning content management system
LLL	Lifelong learning
LMI	Labour market information
LMS	Learning management system
LXP	Learning Experience Platform
MIS	Management Information System
MOOC	Massive open online course
MOODLE	Modular object-oriented dynamic learning environment
NQA	National Qualifications Agency/Authority
NTA	National Training Agency/Authority
NZIST	New Zealand Institute of Skills Technology
OECD	Organization for Economic Cooperation and Development
OER	Open education resource
SCORM	Shareable Content Object Reference Model
SDGs	Sustainable Development Goals
SMS	Student management system
TVET	Technical and vocational education and training
UNESCO	United National Educational, Scientific and Cultural Organization
UNESCO-UNEVOC	UNESCO International Centre for Technical and Vocational Education and Training



1

► 1. Introduction

Lessons from the pandemic

The 2020/21 global closure of educational institutions due to COVID-19 caused disruption in education and training as TVET institutes rapidly pivoted to online delivery. There is evidence of some poor practice in distance provision as well as interesting digital innovations. Existing inequities were exacerbated and put marginalized groups at further risk of exclusion. Key findings from an ILO/World Bank/UNESCO survey in May 2020¹ led to seven observations about the TVET response:

- Many countries and stakeholders in the TVET sphere were insufficiently prepared to respond adequately and swiftly to the shock caused by the COVID-19 pandemic.
- For many TVET providers, the switch to remote learning has been a process of learning by doing.
- The COVID-19 pandemic has accelerated many changes already under way in training systems and labour markets, such as digitalization, but has also been a major disruptor for economies and societies.
- The need for a rapid response to school closures has substantially increased the understanding of distance learning, appreciation of its benefits, and awareness of its challenges.
- The COVID-19 crisis has also provided the impetus to create or strengthen public-private partnerships and collaboration in TVET.
- Substantial constraints have prevented the continuation of good quality TVET provision for all population groups, in particular those in lower-income countries and more vulnerable households.
- Policy responses and remote learning options have struggled to deliver on some of the key features of TVET, namely the acquisition of practical skills and work-based learning.

The crisis has illuminated issues that are already known to the sector; there is a need to improve internet infrastructure and ensure affordable connectivity; instructors' digital skills and competencies must be developed along with those of trainees; flexible, distance and online training approaches should be part of mainstream delivery to improve both access and resilience. Most importantly, care must be taken not to exacerbate existing inequalities and perpetuate digital exclusion and the gender digital divide.

The impact of COVID-19 on national economies is predicted to be devastating in most cases and will have a similar impact on education budgets. The sector will continue to be required to do more with less and provide access to relevant skills training leading to employability and decent work. Digitalization and digital transformation will contribute to this.

¹ ILO. (2020) *Distance and Online Learning during the time of COVID-19*

Lessons from the field

Skills training institutions are experiencing a period of disruption driven by technological advances and exacerbated by the recent demand for remote service provision caused by the COVID-19 global pandemic. These disruptive innovations affect both teaching and learning as well as institutional processes, and are accelerating digitalization at the institutional level. This is happening in an environment in many countries where all aspects of skills systems are moving towards digitalization.

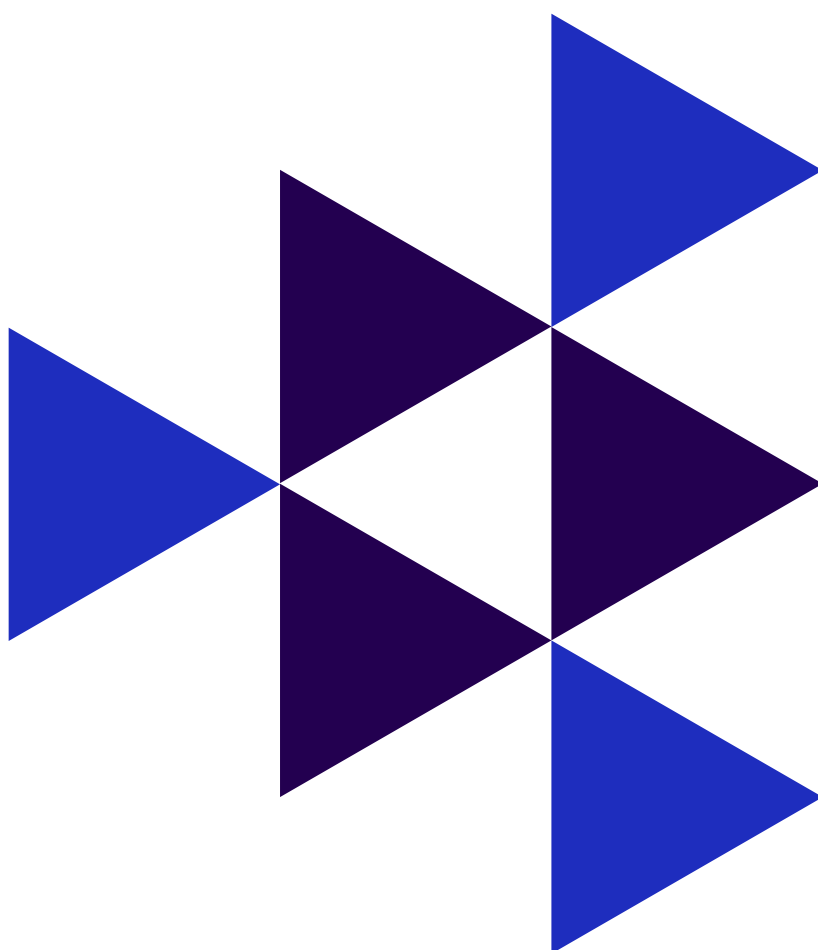
Experience shows that digitalization models that work best have understood people first and digital technology second, with solid change leadership and stakeholder partnerships being a key to successful change. The formulation of this framework is based on this premise.

In this scenario of digital transformation, education and training systems have both external and internal pressures. First, they must respond to the external demand for skills from the digital society and the transition to new world of work, second, as other sectors, they have to engage themselves in digital transformation and the challenges that presents to institutions and staff.

On the demand side, digitalization and technological development is changing the nature of occupations and the skills required in different jobs across all economic activities. Digital transformation means that many of the existing work tasks within traditional jobs will be modified and that some jobs may disappear. Many existing tasks will be complemented by technology. New skills will be demanded, including the combination of digital skills, and traditional core employability hard and soft skills. The development of new work organization modes, induced by digital technologies, such as some non-standard jobs or work in the digital economy, also modify firms' human resource strategies with respect to training and skill acquisition from the market. Real time data and data analytics also penetrate the anticipation and matching function and require new capabilities of labour market institutions and experts, complementing traditional labour market information systems with a more timely monitoring of changing demand for skills.

On the supply side, changes in the modalities of access and learning, assessment and certification are being driven by the increasing use of digital technologies. The use of Open Educational Resources (OER) and the development of Massive Online Open Courses (MOOCs) and blended learning options are increasing the development of more flexible learning pathways. The application of digital technologies through augmented and virtual reality tools, gamification, machine learning and artificial intelligence in education and training is supporting development of new teaching and learning tools and pedagogies and improved monitoring of the teaching and learning processes. Technology is also transforming work-based learning and apprenticeships, not only through improved pedagogies and customized content, but also by facilitating more informal variants such as virtual apprenticeships and internships and other mentored-learning programmes. It is also having an impact on multi-channelled career guidance, self-help services and digital portfolios, which enable individual-centred learning, empower the self-employed and will be fundamental for a new age of digital learning. New forms of certification including digital credentials and open and online badges are also supporting recognizing and validating learning outcomes including non-formal and informal learning, while connecting learners' records is facilitating mobility of students.

The ultimate aim of digital transformation must be to deliver successful skills development policy outcomes whilst avoiding the pitfalls of professionalization and privatization that can accompany the introduction of educational technologies.



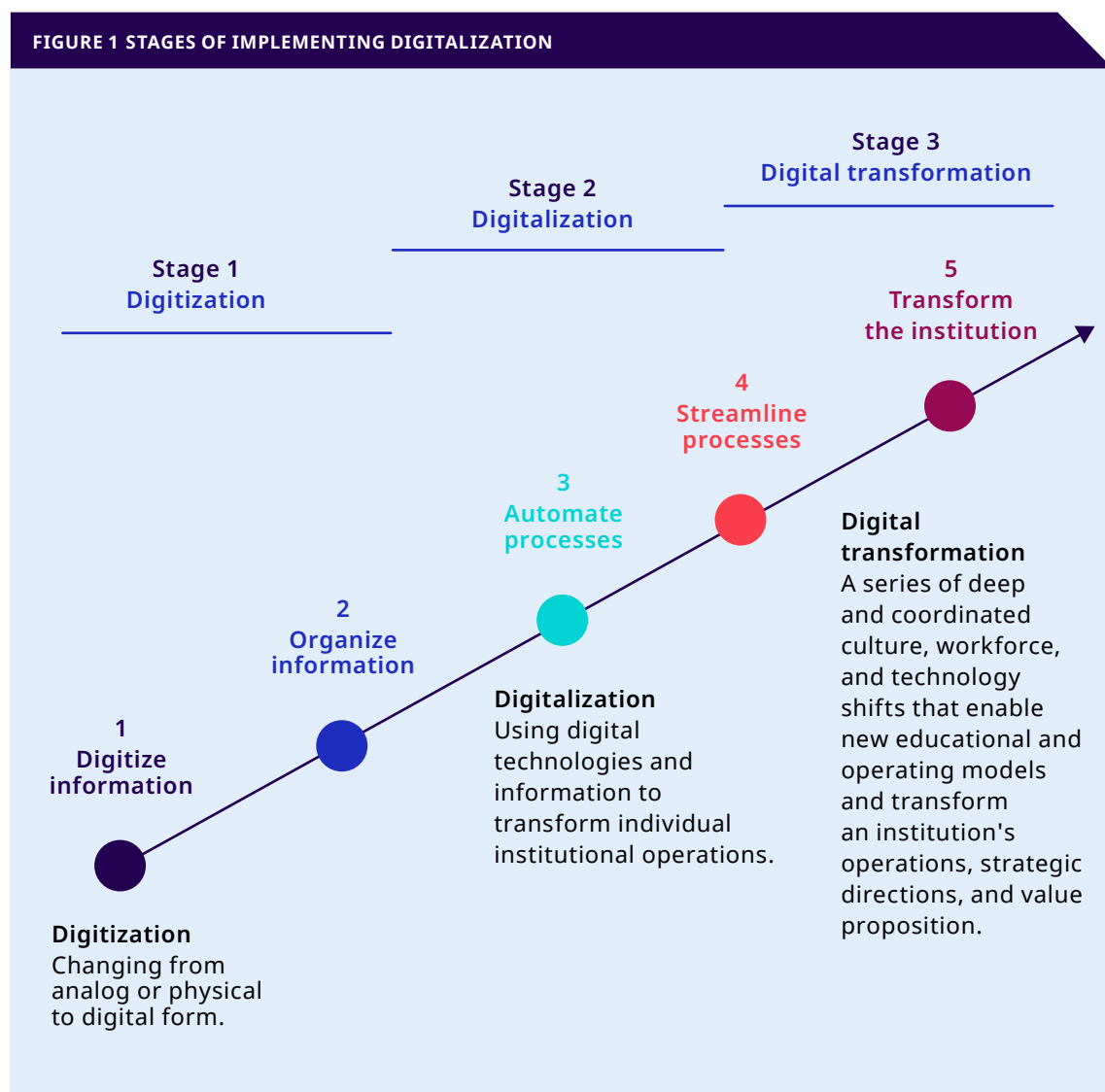


2

► 2. The digital landscape

What is digitalization?

A useful model of digitalization in education settings distinguishes three progressive stages in the implementation of digital strategies in organizations or systems:



From Defining Digital Transformation: Brooks & McCormack (2020)

The Educause² model provides a helpful working definition and important distinction between the conversion of information to digital forms (digitization), which is a mostly technical stage, and utilizing that information to automate and streamline processes (digitalization), which can involve significant, often challenging organizational change. Meeting the challenge successfully can lead to transformation, Stage 3.

The model can also provide a very broad-brush indicator of the current stage of digital development in a TVET organization or national skills system. For example:

► **Stage 1 – Digitization**

A typical early initiative in TVET provider systems is to establish a library of digital learning resources accessed internally through shared hard drives using a content management system (CMS).

► **Stage 2 – Digitalization**

By contrast, providing online registration for school leaver applications to post-secondary study is a more advanced digitalization of a key process, which will significantly impact on a range of factors, such as processing times, communication options and resource planning.

► **Stage 3 – Digital transformation**

Implementing a whole-of-system digitalization strategy for a national skills system or for a TVET institute would signal this stage.

Although we argue that TVET and skills systems should take a strategic approach to their digital transition according to their local needs and capabilities, the three stages defined above do not necessarily occur sequentially as institutions and individuals often drive digital innovation in an organic and ad hoc way.

Here are some country examples illustrating the three stages.

STAGE 1: DIGITIZATION OF INFORMATION	
Papua New Guinea Higher Education Loans Scheme	Papua New Guinea implemented a national Higher Education Loans Scheme (HELS) in 2019. Students can access the application form from their institute, but it is also available online. Students require in-person assistance to complete the application, so the process is still analogue.
CANTA (Caribbean Association of National Training Authorities) Digitized Occupational standards	The Caribbean Association of National Training Authorities (CANTA) is a regional body that promotes the development of a competitive regional workforce and supports free movement of skilled labour between member countries through the creation of regional training standards and certifications. All regional competency standards are published on the CANTA website.

² Educause HED model differentiates Digital transformation (Dx) from Digitization and Digitalization. Educause is a nonprofit association whose mission is to advance higher education through the use of information technology. Educause equip their community with the knowledge, resources, and community-building opportunities needed to help shape strategic IT decisions at every level in higher education.

STAGE 2: DIGITALIZATION OF PROCESSES

Kenya Online course application Rift Valley Technical Training Institute	Many Kenyan Technical Training Institutions have websites with course information and provide downloadable application forms which have to be submitted manually. Some institutions are moving into online course application which can be completed without travelling to the institution.
Sri Lanka Skills Passport	Sri Lanka developed a Skills Passport, which is an online portfolio that records, assesses and verifies an individual's formal and nonformal skills. It is intended to help migrant and returning workers to receive recognition of their learning for employment purposes. Participants receive a card with a QR code for ease of access to their online information. The Skills Passport is a collaborative development between two government bodies, an industry representative body and the ILO.
Philippines Online Bursary Disbursement	The Technical Education and Skills Development Authority (TESDA) has recently partnered with a Fintech company – GCash – to digitally send training funds to TVET students. Recipients now receive their funds directly through a mobile app instead of having to go in-person to collect them.
Jamaica National Diagnostic Assessment and Referral System (NDAR)	Jamaica's National Diagnostic Assessment and Referral System (NDAR) allows prospective learners to apply to any Human Employment and Resource Training / National Service Training Agency Trust (HEART/NSTA Trust) institution training course through one system. Those who do not meet the entry requirements are referred to other possible training to prepare them for course entry re-assessment. It is anticipated that NDAR, with its integration with HEART's training management system, will create learner profiles that can be accessed by training institutions to improve learning experiences.

STAGE 3: DIGITAL TRANSFORMATION (OF ORGANIZATIONS/SYSTEMS)

Singapore MySkillsFuture platform	Singapore, under the SkillsFuture initiative launched the MySkillsFuture platform in 2017, providing students, employers and training institutions a centralized hub for career services, skills assessment, training reimbursements, and other government programmes and awards for skills development. It fits within the government's broader Smart Nation vision to digitalize the country. SkillsFuture is primarily focused on establishing a system that encourages lifelong learning/CPD with an emphasis on 21st century skills.
Wales Digital 2030	The government of Wales has developed a digitalization strategic framework and guide for transforming the post-16 sector (vocational training, adult learning). Digital 2030's objectives align with the different sub-sectors, including leadership, staff development, curriculum reform, enterprise systems and infrastructure, engagement with employers and communities, and access and learner support.
Latvia Going Digital in Latvia	Latvia is focused on changing the education and training system to keep up with a changing economy. This includes a focus on improving the skills of students, fostering life-long learning, reducing skills imbalances and improving governance of the skills system. Digitalization is expected to contribute to changing the education paradigm in Latvia, through improved access to networks of social services, the digitization of schools, libraries and educational material, and e-learning.

There are some cautionary notes to sound in applying the Educause model to TVET and national skills systems. The model implicitly assumes reliable access to quality broadband internet services in the organizations surveyed. Securing that access can itself be the key limiting factor for progress in TVET and skills system settings, so early digitalization strategies and initiatives are often workarounds for the lack of reliable Internet service. When service is not available or affordable through the public telecom networks, departments or ministries may opt to seek their own supplier, perhaps through sponsored programmes.

Also, the focus of the model is individual organizations (and, in the Educause model, universities), not on the wider system. Universities operate as semi-autonomous organizations and businesses in an increasingly competitive international market, and accordingly make independent strategic and purchasing decisions for their digital platforms and services. There is no close equivalent in existing models that reflect the inter-dependent wider skills system described in this report, or the interactions with the labour market and to industry training standards. In addition, many TVET systems are centralized, closer in governance structure to the secondary sector than to universities, with trainers employed, for example, as part of a nationwide teaching service.

There are examples of ambitious Stage 3 digital transformation projects in TVET and skills systems such as Singapore, but they may be the exception rather than the rule in current national skills systems. Digital transformation (stage 3 in the Educause model) is perhaps more appropriately framed as an aspirational and evolutionary stage, similar to whole-of-government digitalization strategies, for many national TVET and skills systems.

But that may be to underestimate the impact of COVID-19 which has accelerated the take-up of online and distance learning and increased interest in the digitalization of TVET and skills development.³

Why digitalize?

A crisis like the COVID-19 pandemic heightens the opportunities for change, even regrowth. On first glance the pandemic has delivered the game-changing reason to digitalize education systems – to support remote learning. It is a necessity, so argument is superfluous. In the foreseeable future, the need to sustain online delivery remains an obvious imperative for digitalization of those aspects of TVET and skills development.

However, although effective online delivery will become a staple requirement of TVET and other education sectors, it is only part of the challenge. The disruption of education has been accompanied by even more drastic disruption of large parts of the labour market in most countries. There has never been a greater need to identify employment patterns, analyse changing jobs and skilling requirements, and match people to opportunities, and all with unprecedented urgency and haste. An efficient, responsive and data-driven skills development and employment services system is needed more than ever.

3 ILO (2020) Distance and Online Learning during the time of COVID-19

Other key imperatives for digitalization remain, heightened in various ways by the impact of the pandemic:

- **To improve the relevance of training products to the labour market**
Achieving better linkage between the labour market demand and training products supply will require effective skills needs identification and anticipation systems along with the availability of relevant labour market information, adequate tools and methods to devise relevant strategies for TVET and deliver trainings in response to the labour market needs, resulting from digitalization.
- **To enable data-driven decision making and inform improved supply side planning**
National TVET and skills systems generally can be perceived as data poor. Digitalization underpins the design and development of the enhanced analytics and reporting systems to monitor the performance of the system and to inform planning.
- **To improve quality, efficiency and reliability**
Well-designed and implemented digitalized processes can reduce costs, save time and deliver consistency and quality.
- **To enable an expansion of learning opportunities**
The digitalization of TVET and skills development will bring more visibility to the training offer and expand access to more potential learners who would otherwise not be able to come to centres or schools.
- **To increase access to and participation in the labour market through skills development**
Digitalization of training support and employment services will enhance the capacity of national TVET and skills systems to reach out and engage more individuals, communities, and marginalized groups. Investment in digitalization promises better integrated information systems, better communication and more flexible training options to empower citizens to build skills and the opportunities to improve lives and livelihoods.
- **To offer curriculum for a digital world**
Digitalization has changed jobs and work processes, and skills systems need to keep up with and keep ahead of changing workplace practices, technologies and skill needs. There will be an expectation that TVET and skills systems should play a key role in developing the wider set of digital skills in and for workplaces. TVET can also be expected to play a significant role in developing training strategies and programmes for emerging digital technologies such as artificial intelligence and virtual reality.
- **To increase the credibility of the sector**
To be perceived as a credible provider of training products and services in the contemporary marketplace, the overall TVET and skills system need to be able to demonstrate innovative processes, current digital skills and practical competence through digitalized administration, communication and programme delivery.
- **To enable linking the different parts of a skills system**
Digitalization offers the possibility to build bridges and linkages more easily between the different parts of a national skills system to improve communication and integrate data and information systems to improve client services, for example by using technology to link recognition of prior learning with a flexible learning offer.

► **To provide innovative online and blended training options**

A quality digital platform to support online delivery in all industry areas has become a necessity for TVET providers. Teachers have had to adapt rapidly to working virtually and using online communication to sustain learning. Skills systems and providers will need to aim beyond a basic capability to explore the uptake of emerging technologies for education and training.

► **To enable national, regional and international networking**

The use of online technologies facilitates borderless communication among practitioners, enabling a greater sharing of best practices, solutions, training content, therefore building on experience, failures and successes within online learning communities.

Stages in digitalization for TVET and skills systems

For national TVET and skills systems at various stages of their digital transition, an important question is whether there are typical or even recommended developmental stages in building the different digital platforms and processes.

However, it is difficult to make generalizations about the characteristic digitalization development sequence in TVET and skills systems because of the wide variations between countries and the limited data available. In centralized, stand-alone TVET systems, core administrative functions such as finance and payroll, and perhaps student enrolment, are likely to be digitalized first following the digitalization of central IT. In some jurisdictions, the digital platform will be a subset of the arrangements for universities. In still other jurisdictions, digitalization will have been driven mostly at institute level, often with an initial focus on course management and student access to learning materials, and in some settings building the capability to support blended and online learning.

The pandemic has brought the course delivery function to the foreground because of the necessity of teaching remotely. Rather than viewing the addition of a learning management system and associated applications as an optional extension of the core platform, new digitalization initiatives are likely to start with this reality as a key driver for change.

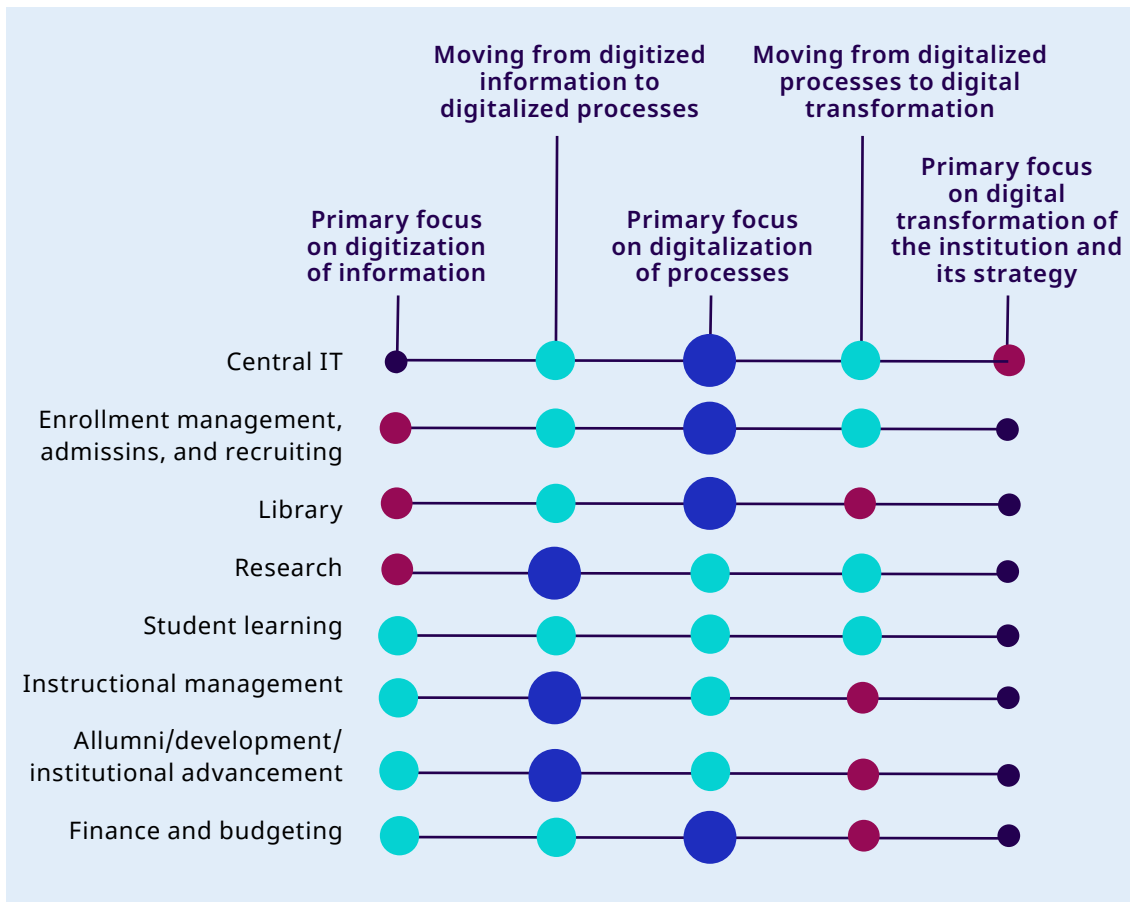
Digital platform implementation: a tentative sequence

An Educause survey⁴ of higher education institutions in 2020 provides a useful snapshot of the functions which are likely to be digitalized earliest in education sector organizations, and which functions are likely still to be in the initial stages, even in more mature systems.

The survey data is presented against the same three main stages of the Educause model, shown in Section 1 – digitization, digitalization and digital transformation – with two intermediate steps added for “moving from” one stage to the next. The size of the circles in the graph indicates which stage institutes have reached. This sample extract of the report shows the first eight functions:

⁴ Educause – [Driving Digital Transformation in Higher Education 2020](#) report based on a survey Educause disseminated to higher education IT leaders to explore their current experiences, attitudes, and practices related to Digital Transformation at their institution.

FIGURE 2 STAGES OF DIGITALIZATION IN EDUCATION INSTITUTES



Driving Digital Transformation in Higher Education. From Brooks & McCormack. (2020). Educause.

There is a natural logic to this order. Central IT is required to make everything else possible. Finance and Procurement are accepted as core functions with stable and established processes, an uncontroversial choice of proven software options in a mature market, and an opportunity to provide early efficiencies, with visible and easily measured benefits to motivate change and secure further budget allocations for digitalization. These functions also involve staff who are likely to be already familiar with computers so have only to learn the specific software (systems training), so it is an achievable level of capability building. The Library function selects itself for digitization in higher education environments, and Enrolments provides the opportunity for the biggest visible impact on the clients and potentially on improved intake levels.

So, in this early notional phase the digital reform can be introduced, the IT support capability established, and some big impact processes with maximum client exposure (Enrolment, Library) can showcase benefits and build momentum for change.

Next group of functions digitalized

Organizations mostly moving from digitized information to digitalized processes in 2020 (column 2 in Figure 2) includes three more core administration and management functions:

- ▶ Human resources
- ▶ Facilities and operations management
- ▶ Management (teaching departments)

and three significant new functions:

- ▶ Instructional management (likely to be a learning management system)
- ▶ Teaching (likely to include scheduling, class allocation, attendance etc.

Early implementation

From the full data provided, the functional areas which were digitalized first in the educational organizations surveyed are now at stage 2 (indicated by large blue circles in the central column the diagram). They include core administrative areas:

- ▶ Central IT
- ▶ Finance
- ▶ Procurement

together with these key student-facing business functions

- ▶ Library
- ▶ Enrolments, admissions, recruiting
- ▶ Credentials.
- ▶ Partnerships (corporate, employer)

So, in this next stage the focus of digitalization moves to the teaching and learning functions, and for the first time, to external communication and information sharing with key client stakeholders. If the digitization sequence is broadly similar in a TVET institute, it is at this stage that the digital links with the rest of the skills development system will become possible. It brings with it more complexity in the selection of software (or software services) and greater challenges in building user capability because they include substantially new tasks and ways of doing things.

Third group of functions

In the 2020 Educause sample, a significant number of respondents were still at Stage 1 (Digitization of information) for many of the functions detailed in the second group. There were also other functions where most organizations were just starting out:

- ▶ (Institutional) Strategic planning
- ▶ Promotion and tenure
- ▶ Partnerships (community)

One final observation from the Educause data: less than 10% of the institutes surveyed judged that they were at Educause Stage 3 Digital transformation (that is, with a “primary focus on digital transformation of the institution and its strategy”) in most of the functions, although up to 40% indicated that they were moving from Stage 2 digitalization of processes to digital transformation.

Summary

This analysis is an initial attempt to describe a likely pathway to digitalization in the education environment. The Educause data from the university sector has been highlighted because it is relevant, current and accessible, but we now need to move to systems for skills development, and to the TVET provider context.

To summarise, here is a likely developmental sequence for digitalizing educational systems at the institute level (or in a centralized national system):

FIGURE 3 LIKELY IMPLEMENTATION SEQUENCE OF DIGITAL PLATFORM FUNCTIONS IN EDUCATION

	First group (early)	Second group	Third group
Core administrative functions	Central IT Finance Procurement	Human resources Facilities and operations management Management (teaching departments)	
Client services and teaching functions	Library Enrolments, admissions, recruiting Credentials.	SInstructional management (likely to be a learning management system) Teaching (likely to include scheduling, class allocation, attendance etc.)	
Strategic and external relationship functions		Partnerships (corporate, employer).	(Institutional) strategic planning Promotion and tenure Partnerships (community)

The TVET context for digitalization

What are the distinctive features of national TVET and skills systems which have implications for how digitalization is undertaken or evolves?

FIGURE 4 FEATURES OF NATIONAL TVET AND SKILLS SYSTEMS

Features of national TVET and skills systems	Implications for digitalization
Large gaps in infrastructure, equipment and e-readiness capacity	<p>Challenge: Connectivity is a critical determinant for the client service and teaching functions. Digitalization of these functions should not be pursued if it increases the risk of exclusion of disadvantaged groups. Equipment, connectivity and digital literacy issues need to be identified and addressed which may require additional financing.</p> <p>Opportunity: Investments in equipment, connectivity and digital literacy as enablers for the digitalization and expansion of TVET and skills systems would enable increased access to vulnerable learners who, without access to Online and Distance Learning, would be excluded from learning opportunities.</p> <p>Opportunity: Connectivity and equipment provided in the framework of education and training also has the potential to include more vulnerable groups and communities in the broader digital economy.</p>

FIGURE 4 FEATURES OF NATIONAL TVET AND SKILLS SYSTEMS (SUITE)

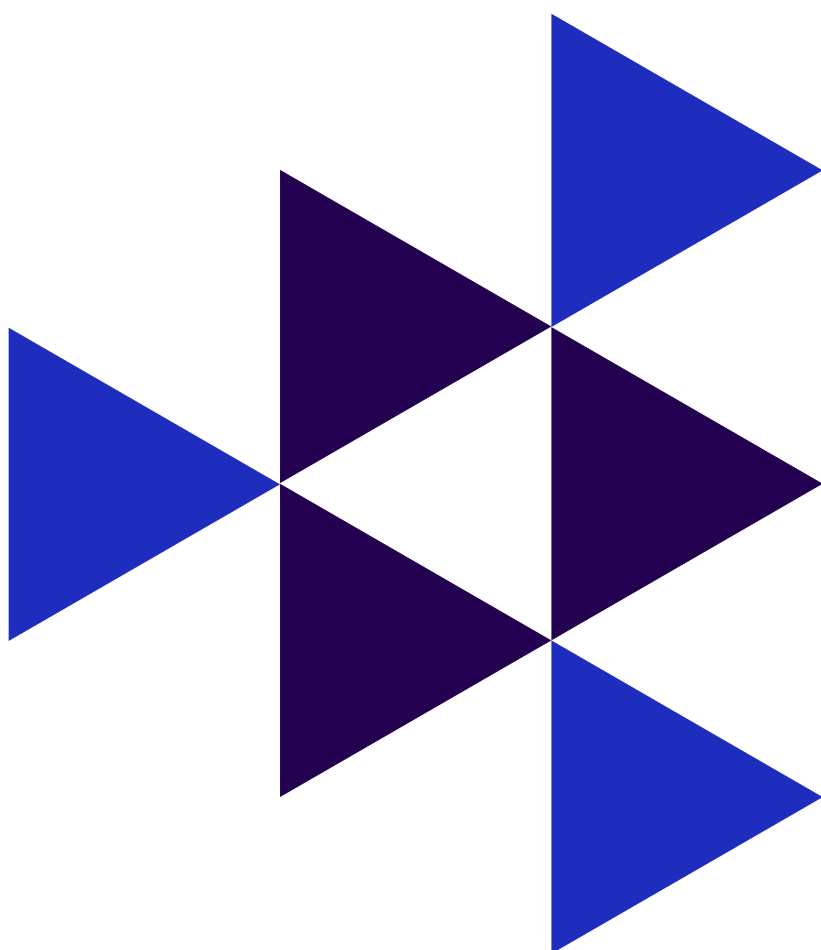
Features of national TVET and skills systems	Implications for digitalization
Weak and fragmented systems of skills identification, anticipation and monitoring	<p>Challenge: Poorly developed skills anticipation systems limit countries' ability to identify skills gaps, and to analyse future training needs and shortages systematically and comprehensively (many in low-income countries). This in turn makes it difficult to develop specific skills policies, shape TVET appropriately, and adapt skills training and active labour market programmes (ALMPs) to current and future demand.</p> <p>Challenge: As digitalization is spreading fast in various domains and technological change is rapid, existing training programs find it difficult to meet the changing skills demand.</p> <p>Opportunity: Leverage the use of technologies to make curriculum systems more flexible and responsive.</p>
Significant differences between national systems The governance, regulation and delivery arrangements and the progress towards digitalization will vary significantly between nations. Differences in the capability of national telecommunications networks will frame the options realistically available to TVET planners. Some TVET systems will be embedded in university or tertiary sector funding, management and IT structures, some will be independent, and many will be something in between.	<p>Challenge: there is unlikely to be a common pathway to digitalization or a single model for implementation. TVET and skills systems need a way of assessing their current state, clarifying their options, and planning and managing change.</p> <p>Opportunity: country systems which are at early stages or currently lack national cohesion may be able to benefit from more detailed information about methodology and the benefits of digitalization from other TVET and skills systems.</p>
More varied teaching backgrounds Many TVET trainers come from careers in their particular industry, so that teaching is their second career. Some will have limited or no experience in office-based work in departmental settings and the digital literacy which that requires. Some TVET teachers have never worked in industry or did so 20 years ago and have not updated. They are hired because they have technical qualifications and skills and may have no teaching qualification or training.	<p>Challenge: building digital literacy for TVET trainers and administrative staff will be a major enabling issue in digitalization of national TVET and skills systems.</p> <p>Opportunity: online learning using self-paced resources for trainer training offers a scalable and cost-effective way to build the digital capability of the TVET workforce. This method is widely used in corporate/business training, and there are extensive programmes and quality resources available.</p>
National standards-based curriculum In skills systems which publish and mandate national training standards, providers need to design and deliver programs which address the training outcomes described in the standards and meet the assessment requirements. Many countries do not currently have a national TVET curriculum, or standardized training outcomes based on industry requirements or competency statements.	<p>Challenge: requires periodic mandatory updating of courses and learning materials (because of changes to standards), which usually requires a fully-featured learning content management system (LCMS) either centrally managed or at institute level.</p> <p>Opportunity: learning and assessment materials developed for a course are reusable anywhere in the system (because they address the same outcomes), offering efficiencies of scale for development of high-quality exemplar resources. Interoperability of learning systems (e.g. using and tracking online resources complying with international standard format SCORM – Shareable Content Object Reference Model) a significant enabling issue.</p> <p>Challenge: the culture of sharing learning and assessment materials between TVET institutions, even when publicly funded, is not evident in all countries.</p>

FIGURE 4 FEATURES OF NATIONAL TVET AND SKILLS SYSTEMS (SUITE)

Features of national TVET and skills systems	Implications for digitalization
Multiple stakeholders <p>The wide range of agencies involved in national TVET and skills system (education and training institutions and local authorities, industry groups, employers, ministries, standards setting bodies, provider registration authorities, trade unions, employment services) means effective, reliable and coordinated communication is essential.</p>	<p>Challenge: TVET and skills systems generally provide one or more key online portals (e.g. for providers, for learners, for employers) to be designed, managed and maintained.</p> <p>Challenge: managing access, authorization and security across multiple stakeholders requires considerable technical expertise and a culture of collaboration and trust.</p> <p>Opportunity: effective use of digital communication tools such as web-conferencing and CRM software can provide significant social and business benefits to all stakeholders, and reduce costs, notably travel expenses).</p> <p>Opportunity: Make the most of technologies to strengthen links and communication within a wide variety of stakeholders and promote social dialogue in this new hybrid and interconnected ecosystem.</p>
Close interface with industry <p>TVET and skills systems engage directly with industry groups to identify changing training needs and to develop and update training standards and goals accordingly. Apprenticeship programs require close operational collaboration between employers and training providers. Competency-based courses aim to produce 'job ready' graduates, including evidence of authentic experience in workplace or equivalent settings. TVET trainers in some systems will be required to maintain currency of their skills in their industry area.</p>	<p>Challenge: designing effective digital platforms and processes will require robust ongoing consultation between stakeholders and effective promotion of the benefits.</p> <p>Challenge: in a multi-user environment crossing organizational borders, establishing privacy protocols and security of data will be a significant task.</p> <p>Opportunity: a new breed of digital applications and services now emerging in the education sector may provide solutions to networking institutes and the national skills system to industry, sharing and updating data, identifying demand, and automating capture of analytics for collaborative planning.</p>
Multiple provider types <p>TVET and skills systems can include large and small public providers, private providers, community providers, secondary schools with TVET programmes, employers providing training, and universities.</p>	<p>Challenge: designing and managing online information and communication systems for a diverse group of organizations.</p> <p>Challenge: managing access, authorization, data privacy and security.</p> <p>Opportunity: digital communication systems and tools offer many new ways to improve participation and collaboration.</p>
Heterogeneous learner groups <p>TVET and skills systems provide for a wide range of learners, including many with profiles such as low literacy, second-language challenges, limited self-directed learning skills, physical disabilities or low computer literacy, no connectivity and/or equipment.</p>	<p>Challenge: systems training and guides for digital services will need to provide clear and highly visual or aural guidance, with adequately resourced, accessible user support services</p> <p>Challenge: many TVET students are likely to have little or no connectivity and equipment (computers or mobile phones) to use the internet. According to the GSMA Connected Women - Mobile Gender Gap Report 2019, in low and middle income countries, 45% of adults do not use mobile internet, and women are 10% less likely to own a mobile phone and 23% less likely to use mobile internet. Strategies for providing access to equipment and services for students and teachers will be a critical part of any digitalization plan.</p> <p>Opportunity: the remarkable level of uptake of synchronous communication tools to meet remote teaching challenges provides new course delivery options which are visual, aural, interactive and collaborative. Video-based virtual classrooms are likely to suit the learning styles of students who may be challenged by the traditional text-based reading with mostly written responses common in many courses.</p>

FIGURE 4 FEATURES OF NATIONAL TVET AND SKILLS SYSTEMS (SUITE)

Features of national TVET and skills systems	Implications for digitalization
Multiple pedagogies <p>While higher-level TVET courses (diploma and above) may resemble university-style read-and-reflect guided independent study, many TVET programmes require a more directed style of group learning, physical demonstration of procedures, and frequent opportunities for learners to practise skills. Teaching methods may also vary considerably across the different industry areas.</p>	<p>Challenge: where blended delivery is used by providers in more mature skills systems, the learning platform needs video capability and fit-for-purpose virtual classroom service for scheduling and supporting facilitated group online learning.</p> <p>Challenge: building trainer capability in the complex skill of facilitating online group learning in a virtual classroom environment.</p> <p>Opportunity: the benefits of applied learning are not limited to technical subjects. Wider access to quality competency-based teaching and learning materials through curated digital repositories has the potential to share practice, fast track teacher capability development, reduce their workload whenever solutions are aligned with their needs and improve quality for learners.</p>
Practical and on-the-job training <p>While more theoretical, formal courses are easily taken online, practical, experiential and on-the-job training, often present more of a challenge and require more sophisticated tools, approaches and tech-enabled solutions.</p>	<p>Challenge: using digital tools like AR and VR for training delivery in occupational areas involving the use of machinery or raw materials will prove to be challenging and costly.</p> <p>Challenge: Assessment in such programs also requires new approaches and methodologies that don't compromise quality.</p> <p>Opportunity: learners in the workplace can benefit from well-designed but low cost online tools to develop their skills on-the-job and continue learning even in hybrid or teleworking environments.</p> <p>Opportunity: digitalization of practical and on-the-job training has the opportunity to bring more interactive and efficient skills development approaches, when digital tools are added in the "smart" classrooms, or that AR is used, for example, to train students in hazardous environments, therefore minimizing risks and training time.</p>
Record-keeping for regulation <p>Especially where the national skills system has developed audited standards for training providers, the TVET sector can experience relatively high levels of reporting with significant workloads for administrators and trainers to maintain and submit the necessary records of compliance.</p>	<p>Challenge: developing and implementing digital processes to streamline quality assurance regimes will require significant collaboration with regulatory authorities and may require extensive collaboration between providers.</p> <p>Opportunity: specialized QA applications coming on to the education market may provide customisable, supported solutions with a shorter system development timeline.</p>
Record-keeping for competency-based assessment <p>Providers and TVET trainers using competency-based approaches and industry-based standards for course outcomes may be required to collect and manage quantities of evidence of competence in a range of digital formats, notably video.</p>	<p>Challenge: digitalization often requires formalizing and standardizing processes to be able to develop an agreed solution. With assessment this is not likely to be easy.</p> <p>Opportunity: provide providers/trainers with content management tools (such as online portfolios) to help automate collection of evidence of competence for assessment, and data dashboards to help trainees, teachers and assessors track progress.</p>





3

► 3. Digitalization in national TVET and skills systems

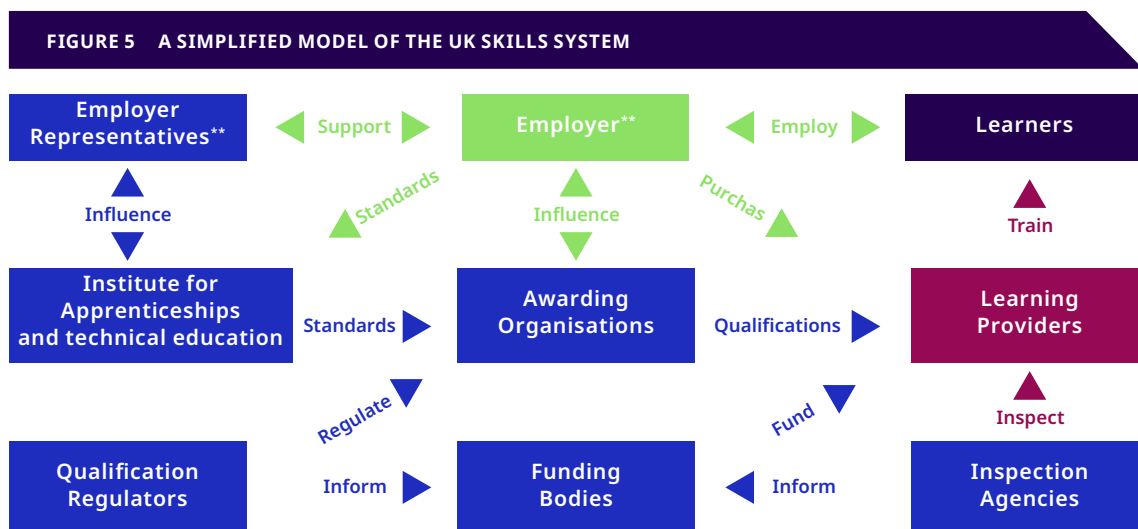
What is a skills system?

A national skills system can be understood to describe the specific arrangements in a country to:

- identify the current and future skill needs of industry, business and the community;
- provide the education and training products and services to respond to the demand and develop the skills required;
- enhance the possibilities for individuals access decent work, sustain livelihoods and wider social participation;
- enable innovation, structural economic changes and strategic business restructuring.

However, this relatively simple description hides the complex and multi-layered interactions between supply and demand at local, sectoral, regional and national levels. In reality, skills systems vary widely around the world and the meaning of skills development and TVET often varies from country to country. “TVET” can be seen as a separate sector that covers a wide range of functions, structural arrangements and programmes. The roles, relationships and configuration of the components can vary considerably from country to country or even from region to region, with different or additional agencies involved. Some will combine several operational roles in a single organization. Not all systems, especially in low- and middle-income countries will include the same elements, and authorities and services may not be specific to the TVET system in that country. A skills development system is often thought to be wider than TVET, encompassing active labour market programs, work based learning and adult education, but this too varies between countries. By contrast, in higher education, where education is delivered by universities, institutional structures and governance arrangements are broadly similar everywhere.

A key feature of all TVET and skills systems however is the complex interaction between a large number of stakeholders and institutions. By way of an example, Figure 5 below is drawn from the UK technical and vocational system, indicating the key roles of different stakeholders and some of the major institutions involved in that system.



From British Council. (2017). *The UK Skills System: An Introduction*. British Council, p. 6.

While useful as a generic description for comparisons across countries, this essentially static overview based on relations between entities does not capture the dynamic nature of demand-driven skills systems, including:

- ▶ **Maintaining relevance and currency**
The need to react more rapidly to changes in industry processes by updating standards, qualifications, and skills development programmes.
- ▶ **Providing evidence and feedback**
The increasing significance of labour market research and provider analytics in informing and driving the system.
- ▶ **Promoting access and participation**
The growing urgency for strategies and services to increase participation in skills development programmes.
- ▶ **Supporting employment and the utilization of skills**
A growing emphasis on strategies to ensure that skills developed will increase employability and contribute to workplace productivity.

All of these trends, as well as the key functions of skills systems, are both enabled and accelerated by digitalization.

Building blocks of a national TVET and skills system

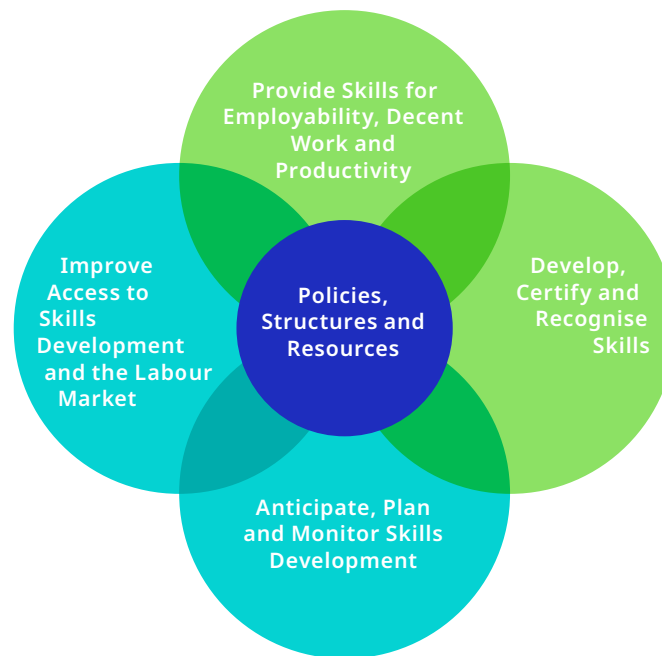
Skills systems involve complex interactions between individual learners, workers and employers, and a range of institutions and stakeholders in the public and private sector. These include education and training providers, regulatory bodies and intermediaries such as public and private employment services, business support services and local and regional authorities. There are complex financing and data flows, assessment and certification systems and interactions with different policy domains where the politics of skill formation affect the programs and policies that operate. Consequently, it is difficult to address all these aspects and interactions in a simple conceptual framework for skills development.

Given this complex set of actors and interactions, the concept of “building blocks” of skills systems (ILO 2021) has been developed to present a simplified model of a skill system that highlights the key functional areas. The “building blocks” identify the five high-level functions of a skills development system as:

- ▶ **BB1** Provide policies, structure and resources for skills development
- ▶ **BB2** Anticipate, plan and monitor skills development
- ▶ **BB3** Develop, certify and recognise skills
- ▶ **BB4** Improve access to skills development and the labour market
- ▶ **BB5** Provide skills for employability, decent work and productivity

The summary diagram (Figure 6) reflects the five building blocks and the centrality of policies, key institutions and financing to all areas of operation.

FIGURE 6 THE FIVE BUILDING BLOCKS OF SKILLS SYSTEMS



The representation in Figure 6 is deliberately generic so it can act as a starting point for reviewing and planning the digitalization in any skills system.

Although there will be common ingredients, few national systems will use the same terminology or have the same names and structural relationships for the parts of the system. Each skills system will reflect its own history and context, and the understandings of the role of training and vocational education in political structure and culture. The components are presented as functions rather than assigning them to named authorities or organizations.

This diagram has been used to inform the framework and to structure the remainder of the report. The five building block functions are addressed in turn, providing a description of some key aspects of digitalizing each function, presenting some examples from national skills systems around the world to explore, and identifying key tools and guides which can assist leaders in national systems and institutes with planning the next stage of digital transformation. For ease of reading, Building Block is referenced in the text as BB, so Building Block 1 (Provide policies, structures and resources for skills development) is referenced as BB1.



4

► 4. Provide policies, structures and resources for skills development (Building Block 1)

Overview

In providing the legislative base, policy framework and resourcing requirements, national governance in TVET and skills systems is characterized by the establishment and coordination by government of several key agencies. At national government level:

► A government department

Typically the Department of Education and Training with overall responsibility for post-secondary education, although in some settings a standalone TVET department.

► A national training (or TVET) authority

Responsible for policy, resourcing and support of training providers and monitoring the overall quality and effectiveness of the system.

Several ministries other than education will usually have a role in governance of a national skills system, notably employment, finance, ITC, or Digital Transformation.

Governments typically establish three other national agencies with operational responsibilities in the system: an industry skills body, a training provider registration authority, and a qualifications and accreditation authority. Although the establishment and monitoring of those agencies is clearly a national governance task, the digitalization of the operations of the agencies will be addressed in building blocks 2 and 3.

Within a yet unpublished draft report, the World Bank is developing a detailed listing of the management and governance responsibilities at various levels of skills systems as a means of describing potential uses of digital technologies and some of the risk factors involved. This unpublished work has informed the description of the digitalization of processes in this and other building blocks.

Key components of digitalizing governance

4.1 Providing a vision, leadership and change initiatives

Most TVET and skills systems will be operating under a current forward plan or vision for the main agencies.

The pandemic experience of 2020–21 has led to wide-ranging re-assessment of many societal systems. In training and education, the shock of adjusting to the remote delivery of programmes has ensured that digitalization is at the centre of all ongoing change strategies in education and training.

What are the options for national skills systems to tackle the challenge of digitalization and the transformation of their ecosystems?

New Zealand: collaborative redesign

An ambitious country-level example from the Pacific region is the New Zealand Institute of Skills Technology (NZIST or Te Pukenga) which has adopted an innovative and ambitious collaborative design approach to “re-imagine” vocational learning.

Coordinated planning “workstreams” are developing principles and proposals for change. Here is an extract of an interim report from the Education Products and Services and Online Arrangements workstreams:

NZIST Workstream report

We took a collaborative design approach. As our discussions progressed, six key principles emerged:

- ▶ Think big, think transformative
- ▶ Start with what is needed to enable the learning journey
- ▶ Technology capability requirements flow from business requirements; specific technology system choices come last
- ▶ Focus on the strategy and capabilities required, not on end-state organizational structure
- ▶ Do not get held up by dependencies and interdependencies
- ▶ Leverage what is good with the current system, and add value to learners, employers and staff

Mobilizing the New World Report of the Education Products and Services and Online Arrangements Workstreams

New Zealand Institute of Skills and Technology Establishment Board 2020

Africa: transformation strategies

In Africa, UNESCO's The Pan African Initiative for Digital Transformation of TVET and Skills Development Systems in Africa was launched on 9 March 2021.

It aims to create an ecosystem to ensure the digital transformation of TVET and skills systems in Africa, so that "everyone is empowered to adapt to this new reality".

The initiative will use five key strategies:

- ▶ Capability building: delivering a Pan African training program
- ▶ Communication: establishing a National Network for Digital Transformation
- ▶ Promotion: conducting ICTs and Digital in TVET days in African countries
- ▶ New resourcing: establishing a Regional Centre of Excellence for digital transformation in each Regional Economic Community (REC)
- ▶ Data sharing: providing a sharing and monitoring mechanism for the initiative, including a platform providing continental and national reports

Summary /Key components

Some high-level tactics in these two current approaches to the digitalization of national TVET and skills systems can be identified:

▶ Aim for transformation

Move past incremental and partial responses – do it now.

▶ Focus on demand

Design digitalization to deliver better specific training solutions for learners and clients in their context (demand): don't get distracted by the enabling platforms and structures as ends in themselves (supply). It is key to have a strategic needs analysis approach, including all stakeholders in a holistic manner, and only then, get consulting advice to ensure you identify, choose, and implement inclusive and interoperable solutions to serve those needs.

► **Engage all stakeholders**

Build awareness, knowledge and ownership through inclusive initial participation and ongoing networking, leveraging the tools digitalization provides.

► **Promote the change**

Identify, articulate and continue to report the benefits for all stakeholders, using the fit-for-purpose digital technologies available.

Planners, policy makers and change leaders in TVET and sponsoring agencies are likely to employ most or all of these strategies to stimulate the uptake of digitalization in national TVET and skills systems.

4.2 Providing the legislative base

In some developing countries, a national digitalization strategy and implementation of a national digital platform will bring with it the need for supporting reforms which may require a significant enabling legislation. This can include:

- formalizing roles and relationships with national industry bodies, or establishing new ones;
- developing and publishing national skill standards or curriculum with relevant stakeholders;
- providing for registration of providers to deliver national curriculum;
- providing for quality auditing and assurance of providers and programmes;
- providing for a national repository for development and distributions of training materials;
- providing a legal base for publishing information on training providers, or licenses to use training materials covered by copyright;
- establishing legal protocols for privacy and data security.

These legislative components may be already partly implemented in a national skills system. Digitalization inevitably leads a system to seek the benefits of standardization in documentation, processes, relationships and communication channels. Digitalization could also have an impact on how a skills system is structured, as well as on the definition of the roles and responsibilities in each building block and the linkages between them.

4.3 Developing IT platforms and interoperability standards

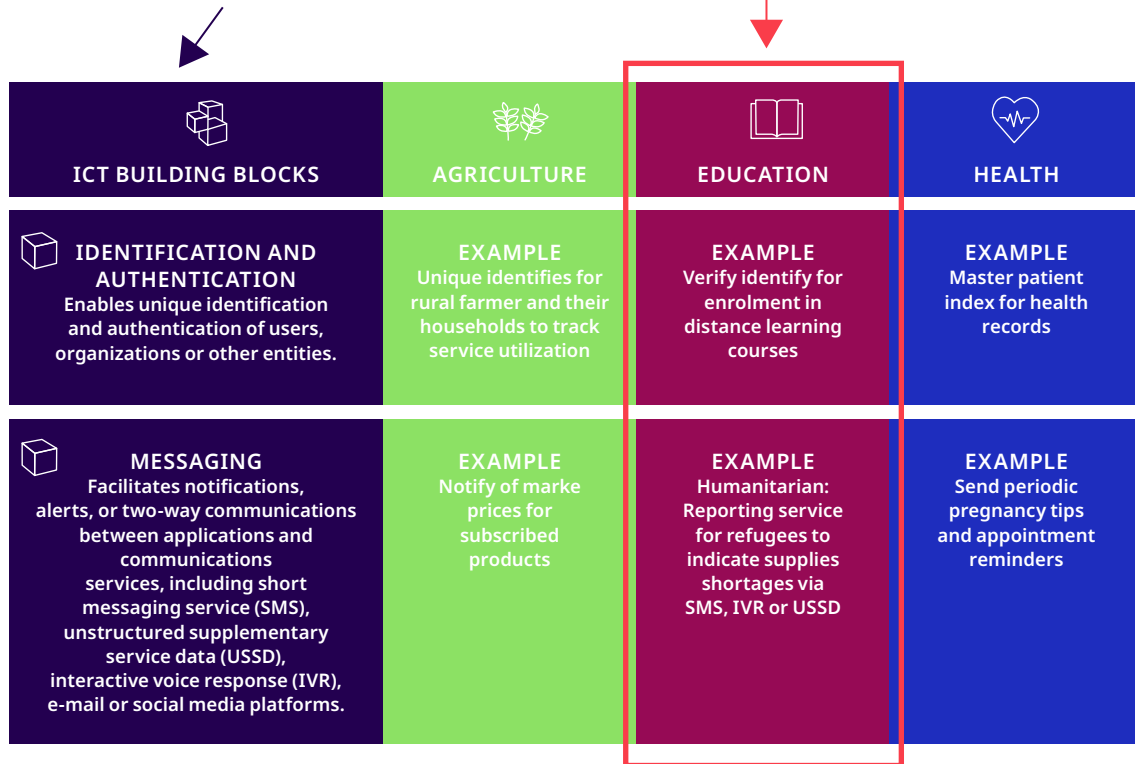
ITU/UNESCO: A whole-of-government framework for digital investment







The International Telecommunications Union (ITU) has developed a compelling framework for designing digital systems based on developing scenarios (use cases) to identify generic processes (workflows) which can be enabled using reusable software components (or ICT blocks).

The approach promises substantial efficiencies if applied in a whole-of-government policy setting where the workflow functionality can be shared across multiple organizations:

FIGURE 7 IDENTIFYING CORE SOFTWARE FOR DIGITAL PROCESSES SHARED ACROSS AGENCIES

Examples of digital processes (**workflows**) which can be shared across agencies using the same core software (blocks), avoiding duplication and reducing costs.



 ICT BUILDING BLOCKS	 AGRICULTURE	 EDUCATION	 HEALTH
 IDENTIFICATION AND AUTHENTICATION Enables unique identification and authentication of users, organizations or other entities.	EXAMPLE Unique identifies for rural farmer and their households to track service utilization	EXAMPLE Verify identify for enrolment in distance learning courses	EXAMPLE Master patient index for health records
 MESSAGING Facilitates notifications, alerts, or two-way communications between applications and communications services, including short messaging service (SMS), unstructured supplementary service data (USSD), interactive voice response (IVR), e-mail or social media platforms.	EXAMPLE Notify of marke prices for subscribed products	EXAMPLE Humanitarian: Reporting service for refugees to indicate supplies shortages via SMS, IVR or USSD	EXAMPLE Send periodic pregnancy tips and appointment reminders

From ITU. (2019). SDG Digital Investment Framework: A Whole-of-Government Approach to Investing in Digital Technologies to Achieve the SDGs. ITU, p. 38.

The model is specifically geared towards achieving Sustainable Development Goals (SDGs) and was developed to address the causes of some of the common failings identified in global investment strategies for digitalization, such as project-limited funding, planning silos, low digital literacy and inadequate provision for scaling up initiatives. The design approach or “architecture” might be applied in principle to any high-level objectives of a system, and the explanatory examples are from Health and Agriculture as well as Education.

This level of integration may be aspirational but, to state the obvious, an essential basic requirement before undertaking national level activity in digitalizing national TVET and skills systems is to find out what is happening in other areas of government. Coordinated action across different ministries or governmental agencies enables a more integrated approach, supports the rationalization of investments, as well as making sure systems are interoperable, and eventually ensure successful monitoring and evaluation.

4.4 Digitalization of work processes

Administrative processes

A cluster of digital products are common to almost all governance functions and associated administrative tasks:

FIGURE 8 DIGITAL TOOLS FOR ADMINISTRATION

Digital application or tool	Purpose and benefits
Websites	Provide improved access to all relevant documents (laws, policies, standards)
Electronic document management systems	Provide centralized cloud-based repositories: accessible from anywhere, reduce loss and duplication, promote compliance
Online survey tools	Gather and process feedback from stakeholders for monitoring and measurement: improved data collection, saves costs, reduces errors, improves quality of data.
Statistical and qualitative analysis software	Analyse structured or unstructured data (video, interviews) saves time, allows data from multiple sources

Source: adapted from the World Bank unpublished draft report (forthcoming 2021)

Virtual work

Another group of applications support effective virtual work. The change to virtual work processes to supplement or replace traditional face-to-face meetings and interactions in an organizational culture is perhaps the most fundamental “hidden” embedded change digitalization brings about in organizations.

A significant challenge for every TVET and skills system is to find ways to engage employers and collaborate with industry to keep in touch with the demands for skills in the labour market. Some of the solutions will be the structural and legislative arrangements in place, but much will be determined by the quality and effectiveness of the communication environment supported, which is to say the relationships developed.

The inter-connectedness of TVET and skills systems makes working effectively virtually a critical success factor. Virtual work is now commonplace in many international and nationally-based companies, and organizations who have reached high levels of efficiency in managing the digital tools required. TVET systems which are in varying stages of digitalization, and whose focus is campus-based delivery, will have steep learning curves to work effectively in the virtual space. Whilst training can help, it is mostly learning by doing, and doing it a lot, especially working in virtual teams.

Figure 9 shows a typical suite of inter-connected tools that a team working virtually will need to master. Products such as Microsoft Teams, Slack and Rocket.chat (open source) provide integrated packages of tools.

FIGURE 9 DIGITAL TOOLS FOR VIRTUAL TEAMWORK

Tool	Purpose
Live meetings software	Providing group discussion, using audio (especially in low bandwidths) or video, including screen sharing of information and using live text chat, interactive whiteboards, with recording option for later replay.
Messaging tools	Providing closed group text messaging for instant updates and feedback between the group. Threaded, dated discussion makes it easy to find earlier items in sequence or by search.
Document storage and access	Providing easy access to all documents relevant to the team or project on a cloud drive for download or upload. Also enables simultaneous work on shared documents.
Appointment scheduling software	Streamlining the process of organizing “best-fit” meetings or visits, ensures notification to participants.
Project management/task tracking	Providing notification of when agreed tasks are due – or overdue. (Composite online project management tools such as Basecamp combine several of the functions listed.)

Source: adapted from the World Bank unpublished draft report (forthcoming 2021)

Team leaders and project managers need to be skilled at selecting and configuring an appropriate mix of tools from the constantly evolving range of options. Group or team members new to virtual work will quickly need to develop mature skills at managing logins/passwords, dealing with different time zones, troubleshooting connection or other technical hitches, managing discussion threads, navigating the suite of tools, managing notifications (alerts when new items are posted), saving items to appropriate locations, selecting who needs to be notified of what, following consistent protocols for uploading and naming new items, as well as managing meeting notifications, scheduling and acceptances. Apart from making sure to include IT teams in the process of decision-making and implementation, this huge change in the way individuals need to work also requires initial communication and change management to understand benefits, and therefore ensure adequate adoption.

As many have learnt during COVID-19, having a Zoom session to keep in touch with friends near or far is not the same process as running an effective online meeting, not to mention conducting a successful online class. These virtual team skills and tools are also, of course, directly relevant to teaching learner groups online, so trainers with office or home-based experience with the newer formats of digital communication have a significant head start.

4.5 Digitalization of learning content development and distribution

In a skills system using industry-based national training standards or common performance-based curriculum outcomes, significant benefits can be achieved by making the decision at a system level, to establish a central repository of training materials and a supporting specialist unit to select, curate, modify or design and develop resources to meet providers' needs. These include:

- ▶ benefits of scale (design once, use many), reduction of duplication of effort across providers (and individual trainers), as well as possibility to customize existing content, rather than designing from scratch
- ▶ sustainable approach to content production and storage capacity thanks to the reduction in the number of content pieces produced and stored

- high-quality learning design of training materials (active learning, relevance of content to outcomes, clarity of information, authentic assessment tasks)
- high production quality of instructional media (print, SCORM modules, video, audio, web-based materials)
- embedded online activities to support and encourage the transition to blended and online delivery
- enable peer learning among TVET practitioners on best practices and approaches to blended learning
- currency and consistency of industry practices (transparent published content for monitoring, with capacity to update)
- reduce trainer workload in preparing course materials, designing valid assessments, addressing standards outcomes increased reliability of assessment through embedded exemplar assessment tasks and strategies in the materials
- reliable management of digital rights and copyright issues at a system level
- leveraging Open Education Resources to reduce costs and contribute to the common good
- opportunities to form collaborative arrangements with suppliers, industry partners, and other national skills systems

Probably as important as any of these benefits, the availability of quality national materials for teaching provides invaluable scaffolding and support for trainers to be able to deliver effective courses in the short term and develop the new skills over time, especially if they are lacking experience in resource-based learning, performance-based training and assessment, applied learning design and blended or online delivery. In other words, well-designed and localized central resources help reduce the otherwise daunting task of using conventional methods of capability building for the TVET training workforce. Experience in a range of settings suggests conventional professional development methods (such as formal courses) can be unacceptably slow, ineffective and costly.

In the private sector, numerous large companies choose to create a centralized Learning & Development Unit (sometimes referred to as a Digital Learning Factory) to set up a centralized repository of content, but also centralize activities such as content curation, design and production, and distribution. This allows end users to manage specific customization to meet local needs. And this private sector learning and development practice is equally relevant in skills systems. Different models or approaches that have been identified in regional, national and sub-national systems are shown below in Figure 10.

FIGURE 10 MODELS FOR NATIONAL TRAINING MATERIALS DESIGN AND PRODUCTION

Approach	Description
Central specialist design and production unit	In-house learning designers, writers, editors, developers (programmers), illustrators and media producers. Contract subject matter experts and industry specialists work in project teams to provide current content and relevant assessment activities.
Central design unit with distributed development	Development work managed by the unit, but content writing/updating contracted out by tender to capable public, private or industry agencies, notably TVET providers with the necessary capacity. A variation is to select TVET providers with strength in one (or more) particular industry area to be “centres of excellence”, responsible for writing and updating national learning resources in those areas, working with the central design and production unit.
Central distribution unit	Responsible to obtain, curate, distribute and maintain a repository of relevant training materials and resources, by industry and/or training standards. Can be combined with a central design and production unit, or operate separately.
Central flexible learning service	All-in-one service including content design and development, content repository management and distribution, capability building support to providers, and in some cases, managing online course enrolments.
Integrated regional/national learning platform and content service	In some systems the central unit will also manage the supported central learning platform, usually a suite of integrated applications (including learning management, learning content management and web conferencing) available to all providers, including employer and government users.

Source: Authors (2021)

Like national training standards, central content units represent a substantial initial investment for national TVET and skills systems, and will require adequate ongoing resourcing and robust change management strategies to succeed. They are best conceptualized as a transformational process for the system, not just the addition of another “digital service”. The potential benefits, however, are proportionate to the challenges.

Digitalization changes roles. For everyone.

It is important to call out one of the major – and often hidden – challenges of digitalizing TVET and skills systems. Implementing a learning management system (at national or provider level) together with adopting an industry-based national curriculum (especially if accompanied by nationally distributed training materials) will inevitably change what may be considered the traditional role of a TVET trainer. Rather than working as an individual agent (a “professional”) who prepares, teaches and assesses “their” course (as in most university education), they are more likely to be working in a collaborative team environment, with an externally administered curriculum, shared teaching materials prepared by others, and interacting with a range of specialists (in IT, learning design, assessment) not to mention the quality auditors.

It is a different environment with new roles and processes to bed down. There are some real advantages to be sure, but also stubborn disincentives, especially for trainers with low digital literacy. Not every trainer will be thrilled, and some will feel deskilled and resent the loss of autonomy in the classroom. The reasons for change, and the promised benefits, will need to be explained, promoted, measured and realized. It is common in digitalization consultancy processes to identify the benefits for the “business” (the institute), and the “clients” (the learners), but less common to address the impact on trainers. That is not a recipe for effective or sustainable change.

We will discuss the digital tools and processes for training content design and development in the next building block. At a system level, it is a significant governance challenge to select the best-fit structural and operational options for the design, development and distribution of training materials in the national skills system in consultation with the institutes and their teachers and trainers. There is also a need for leaders in institutes to develop an effective social dialogue with all staff to agree on policies and change strategies for introducing the new arrangements.

4.6. Implementing digitalization in governance systems



Key implementation guidelines

Digitalization in governance systems

- Envision digitalization as a way to thoroughly rethink national TVET and skills systems using innovative approaches, not simply adding technology to existing organizations, processes or curricula.
- Prepare to move from short-term, emergency responses, to longer-term strategic approaches to digitalization, digitization and digital transformation, adapted to your own local needs.
- Provide a fresh vision, with proactive leadership and targeted change initiatives.
- Push for the implementation of policies on infrastructure, connectivity and equipment, to make sure digitalization of national TVET and skills system is inclusive, and does not increase the digital divide.
- Promote and foster cross-ministries joint work to enable efficient linkages between all parts of the TVET and skills system.
- Foster communication and anticipate change among teams and individuals, involving all stakeholders to prepare them to the new ecosystem's changing roles and responsibilities.
- Review current communication and collaboration systems and practices to implement systematic digitalization of effective virtual work processes across the skills system.
- Develop or upgrade national IT platforms and interoperability standards to support new digital applications and promote secure access.
- Include IT teams in the earliest stages of the digital transition to anticipate all the linkages, and to keep them as allies all through the process of implementing, maintaining and upgrading relevant technical solutions.
- Adopt a user-centric, demand-oriented approach, using techniques such as design thinking to make sure all actors are involved, thus maximizing inclusion as well as adoption.
- Promote and push for the creation of national online communities to increase sharing of best practices and online learning and teaching solutions.
- Consider implementing national curation, development and distribution of core exemplar digital learning materials, by industry, and developing or extending an ongoing specialist national function, to maximize investment, efficiency and quality for a more sustainable approach.

- ▶ Include teachers' and trainers' awareness, training actions and capacity building at the policy level, to make sure educational staff are well aware of the possibilities brought by technology, and prepared to operate in this new ecosystem, including tackling learners' having a hard time adopting it.
- ▶ Include basic digital skills development and opportunities to learn how to learn online at the policy level to ensure lifelong learning is made possible.



Country and regional examples

Digitalization in governance systems

System digitalization

New Zealand

[NZIST](#)



New Zealand Institute of Skills and Technology

New Zealand is currently undergoing a sector reform in TVET, moving from an array of providers to one unified system and one public provider: the New Zealand Institute of Skills and Technology, or Te Pūkenga. Included in this reform is the development of digital systems to support the government's vision for the sector. Initial recommendations for developing these systems can be found in [this report](#).

Digital transformation for marginalized communities

Africa

[Pan African Initiative](#)

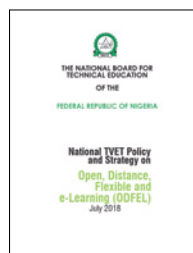


Pan Africa Initiative

In contrast to the New Zealand 'green field' approach, the newly launched (March 2021) UNESCO Pan African Initiative on Digital Transformation of TVET and Skills Development systems in Africa initiative builds on two existing continent-wide strategies, the Education 2030 Agenda and the Continental Education Strategy for Africa (CESA), with a focus on the capability of technologies to reach marginalized and disadvantaged groups.

Legislation for Open, distance, flexible and e-learning

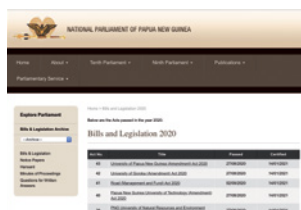
Nigeria



The National Board for Technical Education has developed a national policy and strategy on Open and Distance, Flexible and e-Learning. The policy applies to all TVET institutes and polytechnics in Nigeria and aims to assure a quality TVET programme through flexible educational technologies.

Legislation for digitalized reform agenda

Papua New Guinea



HEGPA Bill 2020

Papua New Guinea is implementing the initial stages of sector-wide digitalization. With the core IT platform in place, the Department of Higher Education Science and Technology (DHERST) is laying the foundation for reform and digitalization of the TVET sector.

The Higher Education General Provisions (Amendment) Bill 2020 (HEGPA) includes provision to establish a National Skills Development Agency, establish a registration system for providers and engage the support of business and industry.



Models and guides

Digitalization in governance systems

Digital Investment Framework

SDG Digital Investment Framework:

A Whole-of-Government Approach to Investing in Digital Technologies to Achieve the SDGs

ITU (2019)



The report includes a detailed and fully-worked sample “use case” of providing remote education and training for a community learner in Niger.

The great value of the approach is that it involves visualizing in detail what the desired functionality would look like in a typical but realistic situation (the use case), and how it would operate to meet user needs. Valuable resources for digital platform designers and planners, and for generating focused discussion about the possibilities that digitalization opens up for innovative and effective training solutions.

Inter-ministerial Coordination for TVET

Taking a whole-of-government approach to skills development

ILO & UNESCO. (2018)



Aims to answer the question: Does the adoption of inter-ministerial coordination mechanisms assist in the achievement of TVET and skills development policy objectives?

This publication does not focus specifically on the digital transition but synthesises evidence on inter-ministerial TVET coordination mechanisms from a range of countries. The report highlights the need for improved communication and information management, key issues that can be addressed through digitalization of key functions and work processes.

Governance of Skills Systems

Strengthening the Governance of Skills Systems: Lessons from Six OECD Countries.

OECD



A comprehensive analysis of how the governance of skills systems can be strengthened. It finds that successful skills strategies depend on the continued collaboration between ministerial departments, agencies, non-governmental stakeholders and local actors across different levels of government. More specifically, it identifies four challenges that need to be met in order to strengthen skills systems:

- promote co-ordination, co-operation and collaboration across the whole of government
- engage with stakeholders throughout the policy cycle
- build integrated information systems
- align and co-ordinate financing arrangements

Case studies include countries that have employed digital systems to improve information management and data interoperability for better skills governance.



5

► 5. Anticipate, plan and monitor skills development (Building Block 2)

Key components of digitalizing anticipation, planning, and monitoring of skills development

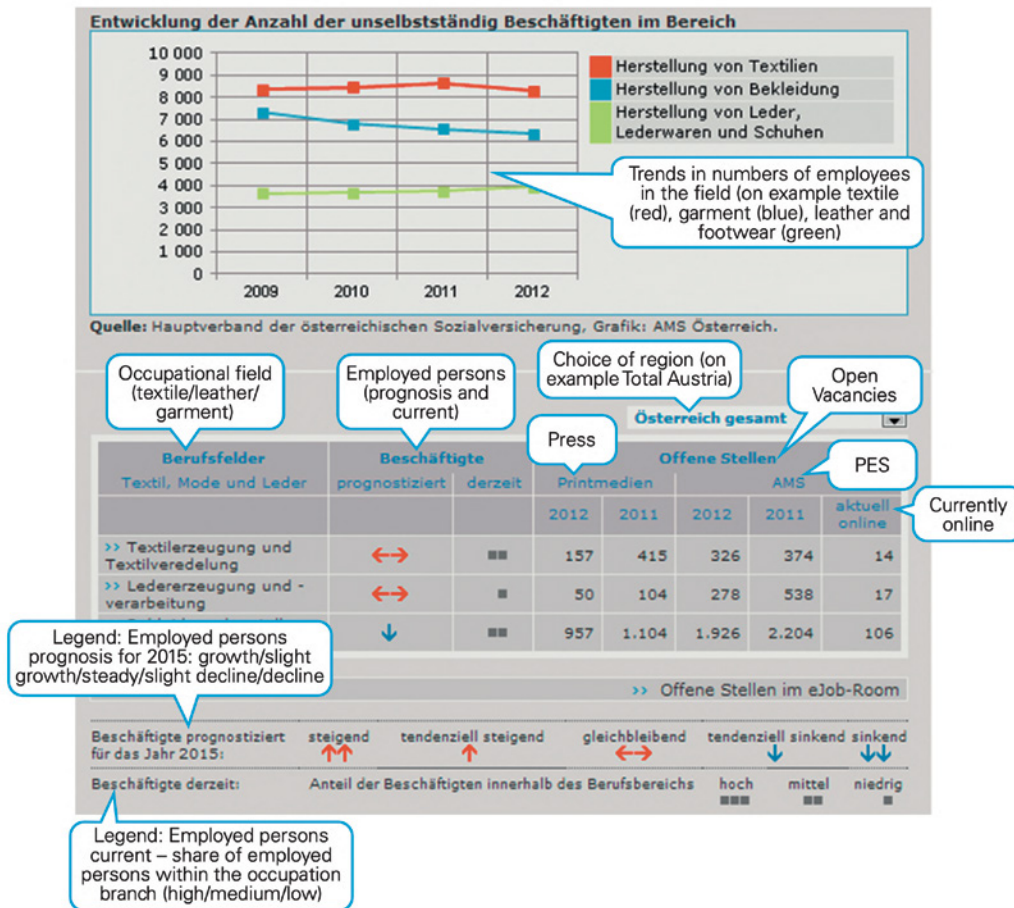
5.1 Labour market skill needs analysis

The digital systems and tools for gathering and analysing Labour Market Information (LMI) is a specialized technical field beyond the scope of this framework.

However, there is an increasing emphasis on using a variety of digital channels to publish LMI in suitable formats for a range of different stakeholders. The joint ILO – ETF – CEDEFOP Guide to anticipating and matching skills and jobs⁵ includes examples of dissemination strategies for policymakers in the skills system, for the general public, and for employees. The guide includes an example of an interactive “skills barometer” from Austria showing trends in the textile industry and related industry for the general public:

5 Using labour market information - Guide to anticipating and matching skills and jobs, Volume 1 (ilo.org)

FIGURE 11 AUSTRIA – QUALIFIKATIONSBAROMETER



Source: European Training Foundation (see Models and guides)

There is a pervasive overall trend in digital systems towards personalizing information for the users, towards interaction and dialogue rather than static provision of information, and towards networked and collaborative modes of communication and engagement. Such personalized presentation and access to information and data often requires the use of data visualization tools enabling structuring of data according to users' preferences and specific needs. This merges with a more client-centred, proactive and communicative approach to many aspects of training and education. As we will see, in teaching and learning the platforms and tools are becoming as much about links and relationships as they are about "content".

5.2 Information gathering, analysing and publishing

If we look again at the summary diagram of the building blocks for a national system (see Figure 6), a skills system can be viewed as primarily a dynamic information network. There is a business-to-business network between the key agencies in the system, and a public network to employers and learners.

When we look at the potential for digitization of the system, some features stand out:

► **It's data-dependent**

The accuracy, currency and reliability of labour market information is critical to the success of the system, so digitalization can have a game-changing impact on the efficacy of the system.

► **It's connected**

The system is highly inter-dependent: stakeholders rely heavily on reliable and prompt reportage and real-time access to information and analysis.

Real time data and big data analytics are increasingly used for labour market analysis, complementing traditional labour market information systems with more immediate and real time monitoring of the changing demand for skills. This shift demands new systems and capacity in labour market institutions.

The policy paper⁶ published by the inter-agency TVET group on [skill mismatch in digitized labour markets](#) provides examples of big data initiatives from around the globe to illustrate its potential and provides insight into how big data is already supporting policymakers in shaping the futures of work and education.

In a digitalized (or partly digitalized) national TVET and skills system, we can identify several typical websites (or portals) which are needed to exchange curated information between stakeholders. Some sites may be combined, depending on the governance arrangements in the system, and may include a variety of more or less interconnected components, such as:

- existing distinct sources of national LMI that can be collated into one-stop-shop LMI services including, but not limited to: statistics on labour force earnings and labour conditions surveys, employers' skills surveys, vacancy data, training offers and occupational information;
- job boards or portals;
- certification platforms for training and accreditation of training institutes;
- individual portfolio tools and matching engines linked with vacancies;
- cross-service referrals linked to individual case-management, when systems are interoperable.

The high visibility and importance of these multiple "nodes" in a skills system, and their use by multiple stakeholders, is a defining feature of the TVET sector.

5.3 Importance of effective skills anticipation and matching system

In order for TVET and skills systems to better respond to the digitalization challenge, it is critical that effective skills anticipation and matching systems are put in place.

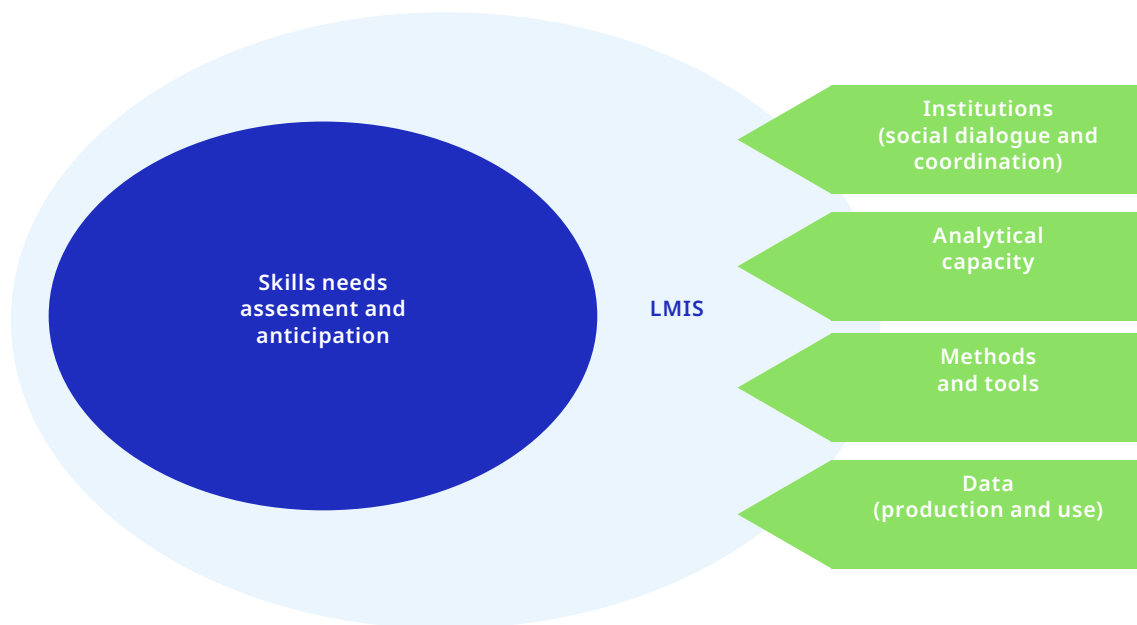
According to the ILO's Anticipating and Matching skills and jobs Guidance note⁷, skills needs anticipation aims to provide information to all labour market actors about potential future skills needs and imbalances, so that they can make decisions, develop measures and take actions with a view to meeting the needs and avoiding the imbalances.

⁶ Inter-agency policy paper Perspectives on policy and practice: Tapping into the potential of big data for skills policy [Perspectives on policy and practice: Tapping into the potential of big data for skills policy \(ilo.org\)](#)

⁷ Anticipating and Matching Skills and Jobs guidance note, ILO [wcms_534307.pdf \(ilo.org\)](#)

As one component of a broader Labour Market Information System (LMIS), skills needs anticipation can be broken down into a number of key elements, namely: data, methods, tools, analytical capacity and institutions. Technologies and digitalization of approaches, methods and tools applied to it therefore can support anticipation of future skills needs to avoid skills mismatch and strengthen training and skills development systems.

As one of the methods, Skills Technology Foresight (STF)⁸, which is the ILO's approach for development cooperation work in skills anticipation initiatives, focuses on identifying and responding to the skills implications of technological change in technology-affected sectors. STF is designed to analyse skills needs at sector level from near to the long-term future through social dialogue and direct interaction with sector stakeholders.



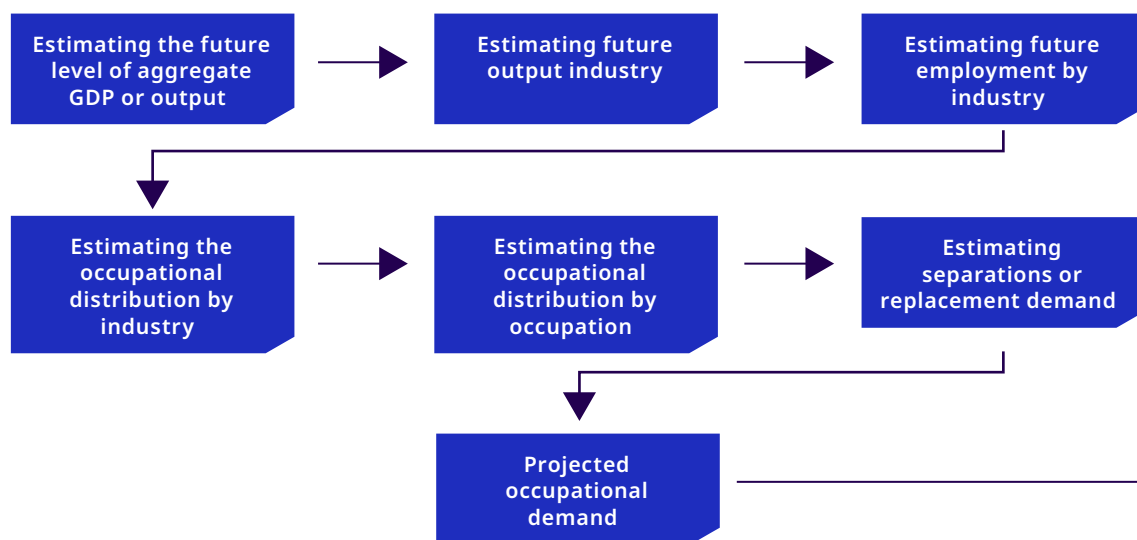
Source: Skills Technology Foresight Guidance Note, ILO

⁸ Skills Technology Foresight, ILO Skills technology foresight guide (ilo.org)

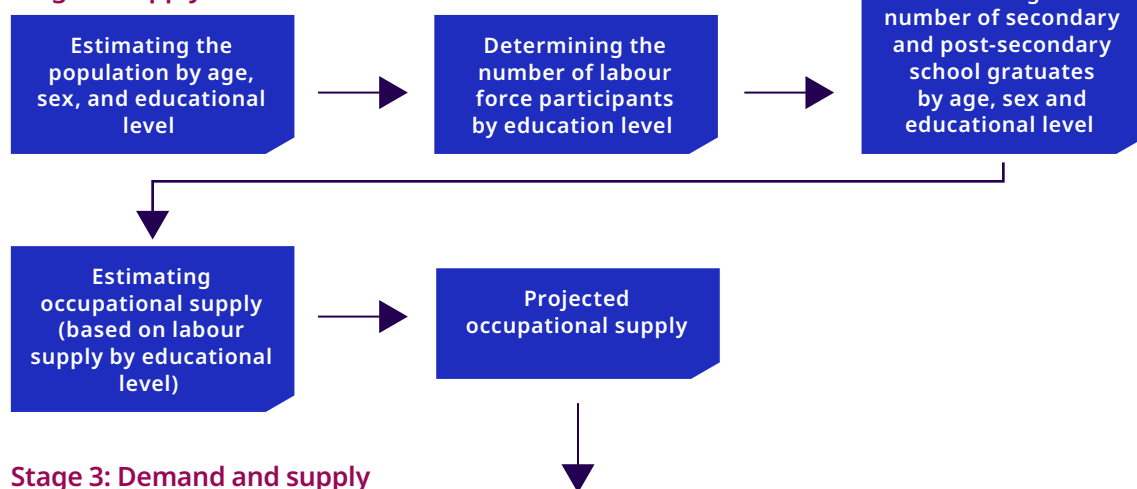
Aligning supply and demand also includes policy decision-making on aspects such as, the number of people to train per occupation or specialization, the number of training places to fund, or the outcomes of labour market placements, and the use of data that can be retrieved, aggregated, analysed and compared from multiple online tools and platforms plays a huge role in facilitating visibility, evolution in time and forecasting.

That of course requires specific technical skills, as well and strong technical links between the different platforms as enablers of such digital transition.

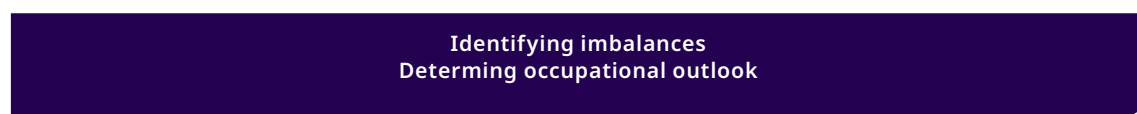
Stage 1: Demand side



Stage 2: Supply side



Stage 3: Demand and supply



Source: S. EI Achkar, *A companion guide to analysing and projecting occupational trends*, CSLS Research Report (Ottawa, 2010).

5.4 The role of skills standards in matching supply and demand for skills

One of the distinctive features of TVET and skills systems is the opportunity to develop national programmes based on documented national standards, which in simple terms describe the levels of performance required to perform job tasks in particular industries.

Although they vary across training cultures, and are understood by a variety of terms, including occupational standards or competency standards, skill standards characteristically have a number of distinctive features in comparison with conventional knowledge-based curricula. Although the format and content of skill standards vary across countries, they typically have the following characteristics:

► **Industry-based**

Skill standards are developed in close consultation with industry and employer representatives to reflect current workplace tasks, roles and skill needs, in contrast to the body-of-knowledge or discipline-based curriculum in most schools and universities.

► **Performance-based**

Skill standards include performance criteria that are task-related verbal statements which describe what learners need to be able to do in workplace or workplace-like settings (e.g. apply safety measures in the workplace). Skill standards also provide guidance on the “authentic” evidence of competence required by performance criteria rather than, for example, completing essays, assignments or quizzes.

► **Standardized**

Skill standards are developed for specific sectors or occupations and provide agreed national frameworks that can inform the development of courses and assessments based on the performance criteria in the standards. This provides a degree of standardization which can influence training delivery so that the training outcomes are similar for a particular accredited course delivered by any registered provider.

The analysis of data captured in the whole ecosystem informs and serves the evolution and changes to be made to the training standards. Digital tools allow changes in skills demand identified in the LMIS to be translated into new or modified standards and qualifications which are produced through an agreed and established collaborative process with industry, in more flexible way, using online communication tools. These characteristics of standards-based curricula and competency-based training and assessment methods aim to provide a more systematic connection between training outcomes and employer needs on the job, so graduates are more “job ready” and employable.

Digitalizing access to training standards is also a way of ensuring all stakeholders are able to access and understand job and skill profiles as well as career paths in sectors where the standards are part of an integrated sector framework of skills and qualifications.

The use of portals or websites to access online catalogues and information library on training standards also enables linking them to other portals or websites and therefore establishing key connections to provide a thorough and possibly seamless experience to the end users. Indeed, training standards can be connected to other key labour market information services such as job boards, skills development opportunities, Recognition of Prior Learning (RPL) portals, skills assessment or profiling tools to identify potential skills gaps, and more.

5.4. Implementing digitalization for stronger labour market skills needs anticipation



Key implementation guidelines

Using technologies for stronger labour market skills needs anticipation

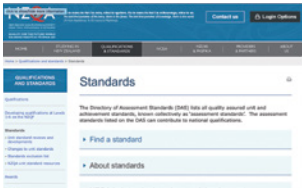



- Benchmark relevant national labour market analysis systems to identify digitalization options which can improve efficiency and effectiveness.
- Review the national LMI network and system for gathering, analysing, and publishing LMI to identify gaps or weaknesses and new digital solutions available to improve performance.
- Improve collaboration between ministries and national agencies in charge of LMI, Education, and Employment, due to the interdependency of collected and utilized data.
- Establish Research and Development teams and/or expert profiles in frontier technologies within Ministries of Labour, Employment and Education to ensure a dynamic and integrated approach to labour market planning is taken, and that new technologies applied to LMI are being anticipated, piloted, and implemented according to the local needs and organizations.
- Review the national processes for aligning skills supply and demand, and (where relevant) consider the business case for implementing national skill standards to deliver training outcomes which more reliably meet identified demand.
- Ensure dynamic evolution of TVET skills development curricula, working on establishing dynamic and closer links with the industry/sectors to inform the design and delivery of in-demand skills and training offers, thus maximizing employability and learning outcomes.
- Adopt a user-centric approach to designing client-facing solutions that use data visualization tools to provide relevant data aligned with end-users needs.
- Make sure to include end-users in the design stages, and anticipate communication and training for all staff members, to ensure efficient uptake and adoption of the new tools and processes.



Country examples

Using technologies for stronger labour market skills needs anticipation

Website/portal	What it provides	Who uses it	Maintained by
The Labour Market Regional Example: EU Skills Panorama 	Skills Panorama turns labour market data into accurate and timely intelligence to offer new insights into skill needs in the European Union.	Policy makers Career guidance practitioners Researchers	Cedefop
The Jobs Job vacancies and career planning Brazil 	Current listings with application details. General career descriptions (type of work, quals needed, remuneration estimates). Guides, planning tools. Support options.	Job seekers Career services	Various
The Skills Forecast Labour market Estonia 	The System of Labour Market Monitoring and Future Skills Forecasting or OKSA is a government initiative to use labour market information in order to anticipate future skill demands. Both quantitative and qualitative data are used to inform the forecasts.	Policy makers Labour market analysts	OKSA
The Labour Market Country example: Canada COPS 	The Canadian Occupational Projection System (COPS) produces analytical outputs and labour market information. The outputs of COPS are widely available through publications or online.	Policy makers Labour market analysts The public	Employment and Social Development Canada

Website/portal	What it provides	Who uses it	Maintained by
The Standards A downloadable summary of skill requirements for each industry area and qualifications available New Zealand - NZQA 	Details of the national training standards/skills curriculum, setting out the requirements for training programs (units, outcomes, assessment) and qualifications available (what units and how many).	Mostly providers to check current requirements, and to design training programs and skills assessment Employers, employer groups, unions. Researchers, overseas educators	Qualifications or standards agency
The Courses A live searchable catalogue of what courses are available where. Sri Lanka TVET Guide 	Searchable listing of all skills development courses available nationally, with details of providers, requirements, dates, costs etc. Can include shorter courses. Can include private providers.	Providers (keep information current) Prospective students Career counsellors	The responsible government department (e.g. "Education and Training" or similar)
The Providers Listing of registered providers Kenya 	Contact details, courses and qualifications registered. May manage upload of compliance data. Provider standards (if available).	Providers (private and public) Regulators Ministries	Provider registration authority
The Trainers Listing of registered trainers Kenya 	Trainer ID number, qualifications, license, and area of specialization. Information on how to register as a trainer.	Providers (private and public) Trainers	Provider registration authority

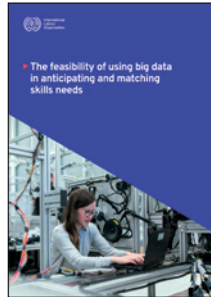


Models and guides

Using technologies for stronger labour market skills needs anticipation

The feasibility of using big data in anticipating and matching skills needs

The feasibility of using big data in anticipating and matching skills needs (ilo.org)



This publication collects together the contributions presented during the ILO workshop “Can we use big data for skills anticipation and matching?”, which took place on 19–20 September 2019 at ILO headquarters in Geneva, Switzerland, and the discussions during the workshop considered the feasibility of using big data in the context of skills anticipation and matching, and both the potential and the limitations of big data in skills analysis.

Anticipating and matching skills and jobs Guidance Note

Anticipating and matching skills and job

ILO



Many countries are experiencing a persistent gap between the skills needed in the labour market and those offered by the workforce. Skills anticipation is a strategic and systematic process through which labour market actors identify and prepare to meet future skills needs, thus helping to avoid potential gaps between skills demand and supply. Skills anticipation enables training providers, young people, policy-makers, employers and workers to make better educational and training choices, and through institutional mechanisms and information resources leads to improved use of skills and human capital development. This guidance note explains the key components of skills anticipation systems, including data, methodologies, tools and institutions.

Collecting labour market data

Labour market information systems:

collecting information and data on labour market trends (2017)

European Training Foundation

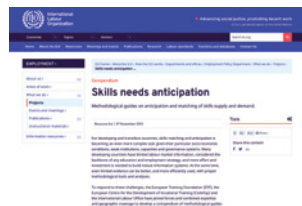


Brief on labour market information systems and what they do; how to develop a labour market system and some limitations. Information on data sources and key stakeholders.

Anticipating and aligning skills

Skills needs anticipation

Joint site of the ILO and European Training Foundation (ETF)



Six guides to the anticipation and matching of skills supply and demand including using labour market information; developing skills foresights and forecasts, working at sector level; the role of employment service providers; how to develop and run an establishment skills survey and carrying out tracer studies. This compendium of six practical guides includes *Using labour market information: Guide to anticipating and matching skills and jobs. Volume 1.* (2016).

<p>Skills technology foresight guide</p> <p>Skills technology foresight guide (ilo.org)</p>		<p>This guide represents a new tool for skills needs anticipation based on the best international practices and foresight approaches. The current methodology is based on the results of the international workshop "Using technology foresights for identifying future skills needs" held in July 2013, which united foresight experts from all over the world. This guidance tool was prepared to steer experts and practitioners in defining future technological change and related changes in work organization, job tasks and skills needs.</p>
<p>Perspectives on policy and practice Tapping into the potential of big data for skills policy</p> <p>Perspectives on policy and practice: Tapping into the potential of big data for skills policy (ilo.org)</p> <p>ILO</p>		<p>This publication has been prepared by the interagency TVET group on skill mismatch in digitized labour markets, to support experts and policy-makers who wish to engage in discussion on the potential of web-based big data for skills policy. The focus is on overcoming conceptual and practical challenges and limitations, system development and using big data for skills policy in practice. Examples of big data initiatives from around the globe illustrate its potential and provide insight into how big data are already supporting policy-makers in shaping the futures of work and education.</p>
<p>Understanding technological change and skill needs: big data and artificial intelligence methods</p> <p>Understanding technological change and skill needs: big data and artificial intelligence methods Cedefop (europa.eu)</p> <p>CEDEFOP</p>		<p>Conventional methods used to anticipate technological change and changing skill needs, such as skill surveys and forecasting, have limited scope to provide insights into emerging trends. With the increasing use of big data and AI methods, analysts have new “real-time” tools at their disposal. Skill foresight techniques are also increasingly used to gauge in-depth stakeholder information about future technologies and skill needs. A series of Cedefop guides aims to inform analysts and policymakers about available skills anticipation methods used to navigate through the uncertainty of changing technologies and skill demands. This second practical guide focuses on automated skills intelligence methods: big data and AI-driven analyses.</p>



6

► 6. Develop, certify and recognize skills (Building Block 3)

Overview

This building block of the system includes training providers (public, private, community and employers) and the authority responsible for registering providers and monitoring the quality of their delivery:

► TVET providers

Design and deliver skill development programmes for the technical and vocational sector.

► A national training provider registration authority

Responsible for the registration and quality assurance of training providers and their programme delivery.

The national qualifications and accreditation authority is also closely related to this block. We have chosen to describe it in Building Block 2 (labour market planning) because of its close association with developing the national training standards (or other curriculum mechanisms for setting required course outcomes) which have a key role in aligning the skills outcomes from training programmes with the needs of the labour market.

TVET training providers have been disrupted by the pandemic, with their digital systems and capability to deliver remote learning severely tested under emergency conditions.

Key components of digitalizing skills development, certification, and recognition

6.1 Digital applications for training providers: the next generation

For educational institutions moving to digitalize course design and delivery, a typical system implementation in the past has involved selecting a group of key applications which can “talk to each other” or be integrated.

Figure 12 is a simplified but indicative diagram of a traditional implementation for an institute, showing some core administrative functions, the teaching support functions, and the content or publishing capability.

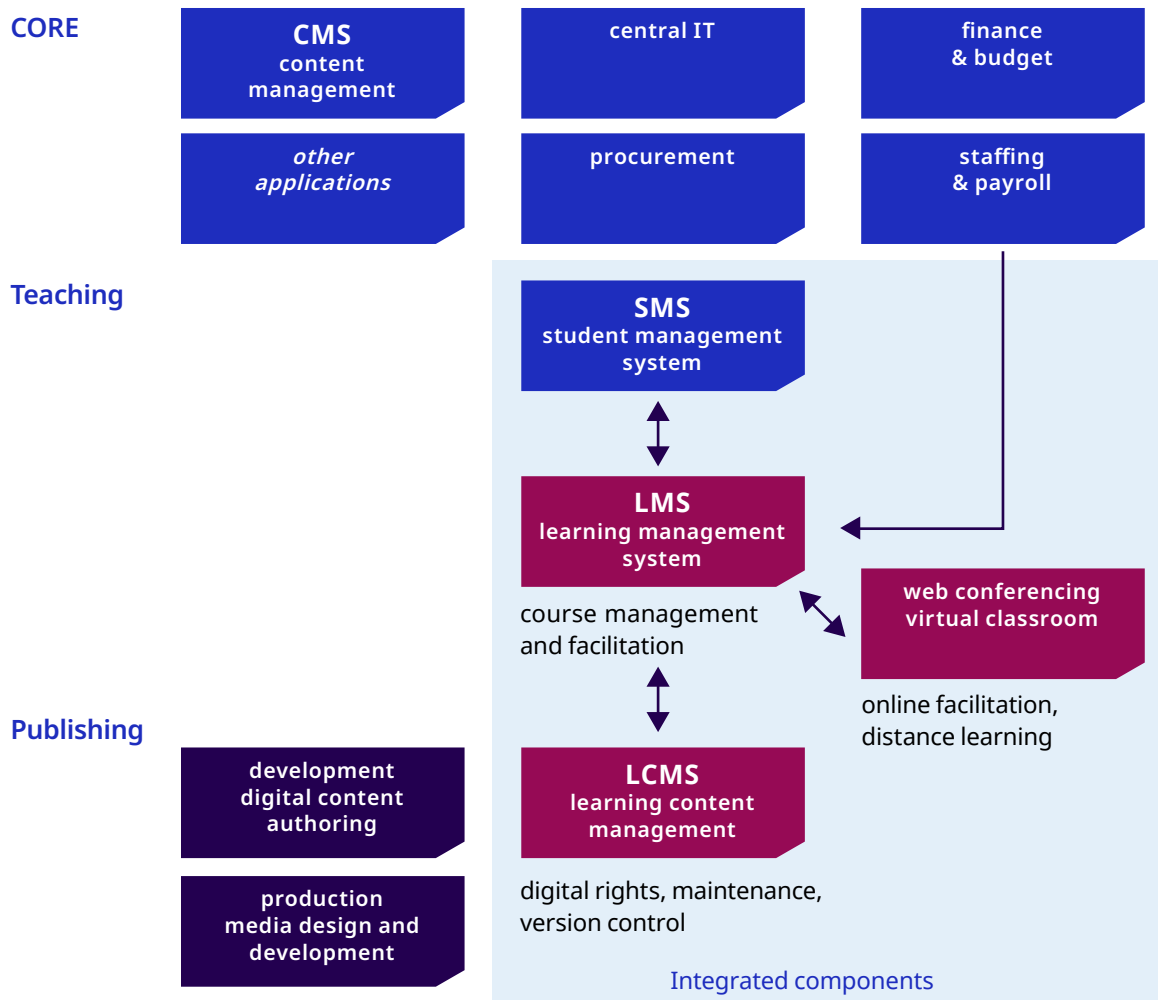
This familiar group of applications and their acronyms will be generally recognisable in any platform design in education.

However, the education software market is undergoing a transformation as new suites of digital tools are being developed for a whole range of new functions. In particular:

- Digital tools are being developed for the whole learner lifecycle, not just the interactions during the duration of a course or programme.

- ▶ The tools include transparent and proactive communication processes with a range of stakeholders in the wider system, including employers, employer organizations, career advisory services, regulatory authorities, sponsors and partners.
- ▶ Hybrid learning management systems are combining the traditional 'virtual learning environment' to support course delivery with capabilities to manage workplace training as well – that is, to train institute staff (professional development).

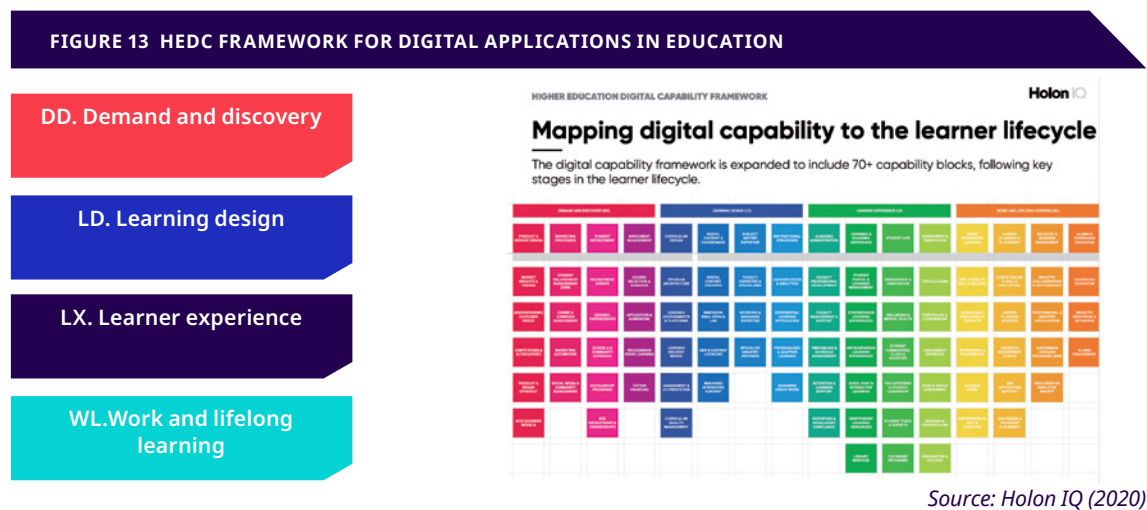
FIGURE 12 TYPICAL INSTITUTE PLATFORM FOR ADMINISTRATION, COURSE DELIVERY AND PUBLISHING



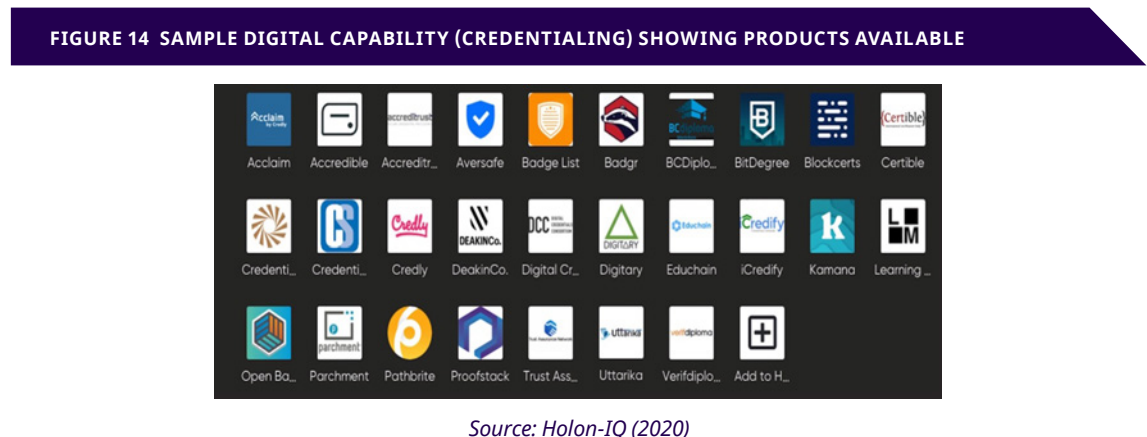
Source: Authors (2021)

Holon-IQ have developed a sophisticated open source model called a Higher Education Digital Capability Framework (HEDC), drawing on extensive analytical data from the market (institutions and suppliers) as well as curated expert input from a range of stakeholders from 30 countries. The result is at once a challenging taxonomy of educational functions and an orientation to the rapidly evolving market of fit-for-purpose digital products designed for education systems. Whilst no similar example from the TVET sector could be found, this example from higher education is included as it provides a useful reference for a number of key functions which do not differ substantially across the sectors.

The Framework identifies four “core dimensions” across the educational lifecycle:

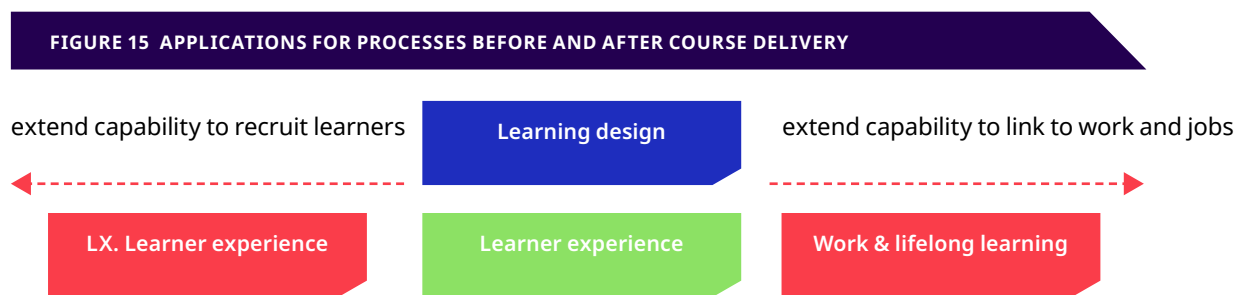


Each dimension then has four “capability domains” (vertical columns in the diagram) adding up to over 70 “capabilities”, or digital system functions (the coloured squares). Here is a detailed view of one of the capabilities, Credentialing, which lists the digital products available in this area:



At first, the model looks complex and overwhelming, with many of the capability labels sounding more like marketing jargon than the language of education. On a closer look, you find that the whole structure is strictly evidence-based: Holon-IQ have systematically mapped applications currently available for each of the 70+ capabilities, so they are documenting recognisable organizational processes in education which have real digital solutions (i.e. applications now on the market), albeit sprouting from a commercially-driven enthusiasm for digitalizing everything. This data-driven analysis has then been consolidated with wide-ranging consultation with stakeholders.

The most striking feature of the model is that it focuses on a number of new or emerging processes in the Demand and Discovery phase before course delivery, and in the Work & Lifelong Learning phase after course delivery:



Source Holon IQ, with Author additions (2020)

The HOLON-IQ Higher Education Digital Capability Framework offers an overarching view for education and training institutions to map and measure digital capabilities across the learner lifecycle, ultimately to support practical and sustainable approaches to digital services and online learning.

We will therefore use the middle two dimensions of the HOLON-IQ model to inform our review of the digitalization of training design and delivery in TVET in this block, Building Block 3 (Training and Assessment). We will return to the other two dimensions in later blocks – *Demand and Discovery* in Building Block 4 (Access) and *Work & Lifelong Learning* in Building Block 5 (Employability).

6.2 Digitalizing course design and delivery

The response to the pandemic has resulted in a new and urgent focus on the readiness and capability of training providers to support remote delivery of classes when face-to-face contact is not an option.

However, the remote delivery arrangements hastily introduced to provide emergency teaching should not be confused with what is required for effective online learning. Supporting fully online learning requires a substantial investment in course design, fit-for-purpose learning content, teacher training and the development of new administrative processes, as we can quickly see by looking at these arrangements in providers which have chosen to specialise in online programmes. It requires nothing less than a different business model to support the different approach to teaching and learning.

“Blended learning” has come to mean a range of things in different contexts, but the essential characteristic is to combine (or enhance) the face-to-face component of courses with varying levels of online activity, including accessing information, completing online activities, engaging with other learners and managing assessment processes. There is a very real sense in which all learning is “blended” now, because even basic systems will rely on learners accessing computers, using digital content and communicating online. There has been a steadily growing adoption of blended learning models and approaches in post-secondary education and in enterprise training.

We have seen how national vocational education and training systems, like other sectors, have been caught under-prepared for the remote delivery challenge at many levels. They have struggled to provide student and teacher access to computer equipment and reliable Internet, to implement and support technologies for live workshops (web-conferencing services), to provide suitable learning resources for online learning, to train teachers to facilitate online sessions effectively, and to cope with a new level of privacy and security issues. Providers may not yet have learning management systems installed or mature processes developed to utilise them, perhaps because LMSs are often identified as systems whose primary purpose is distance delivery, which may not have been considered a priority. Perhaps above all, they have lacked a coherent and determined plan to extend digitalization of their systems and build the processes and skills necessary to support quality blended learning and, when appropriate, the significantly more complex requirements to deliver fully online distance programmes.

Digital readiness to support blended and online learning is largely determined by the effective activation of four core systems, all now familiar in many TVET settings even if at different stages of implementation or at different levels of maturity:

- Learning management systems
- Assessment systems
- Content development systems
- Live classroom systems

They are best described as “systems” rather than “tools” or “technologies”, because successful outcomes will involve much more than selecting and installing the necessary software (although that is never easy) and needs good collaboration and a lot of transparency in the process. Each requires a comprehensive change management plan. Each will generate new or changed roles for staff, new processes and understandings, some new skills for almost everyone involved, and new arrangements for dealing with issues and problems. People in the systems will need to stop doing some things they value and are comfortable with, and do new things which they don’t much like at first. To add to the complexity, it is not easy to predict or anticipate the impact of the system on the organization, so some special planning techniques and external help may be needed.

As an example, the Commonwealth of Learning has a well-regarded facilitated online [course](#) for implementing an LMS (Moodle) at an institute. It is recommended that a spread of staff is involved – not just IT staff – to undertake the course together, and contribute to the change management plan which is the assessable outcome of the programme. The course doesn’t actually deal in detail with the mechanics of installing the Moodle software: there are other resources for that. It is mostly about identifying the impact of the new system on the organization, and planning to make it work for everyone. It’s not so much a course as a workplace change project.

Learning management system options

We have noted that the HOLON-IQ data on the education market has identified the emergence of new tools for institutes to digitize processes across the whole learning life cycle.

Nevertheless, for most systems, the key decision in digitalizing course design and delivery is the selection and implementation of a learning management system. It is useful to distinguish four broad types of LMS:

FIGURE 16 TYPES OF LEARNING MANAGEMENT SYSTEM (LMS)

LMS type	Function	Example products
Virtual Learning Environments (VLE)	Provides a suite of tools for facilitator-led blended learning for on-campus student populations, or with the addition of web-conferencing capability, for delivering courses fully online. Embodies a constructivist ⁹ approach to learning, with a variety of interactions or activities to be arranged by the teacher-author to promote social learning. High learning curve for trainers.	Moodle
Higher Education LMS	Similar to VLEs, but with a simplified interface optimized for university-style teaching and learning, based on reading selected resources or references, followed by group discussion (text forums) and then assignments and quizzes. Moderate to low learning curve for trainers.	Canvas D2L
Corporate or enterprise LMS	Manages a catalogue of self-enrolled self-paced learning courses ("modules") for staff training for the organization. Usually no trainer/facilitators involved, although blended approaches are increasing with self-paced components as part of suite of strategies. Provides detailed completion reporting and analytics, with courses and outcomes mapped to staff roles and competency frameworks, with links to performance monitoring and management. Used mainly for compliance, IT skills (and systems training), on-boarding and soft skills programmes. "Courses" produced in-house or purchased off-the-shelf – wide variations in quality of learning design, from very poor to excellent.	TalentLMS
Hybrid or workplace LMS	Emerging breed of LMS or LXP (Learning Experience Platforms) which combines features of VLEs and Corporate LMSs, so that training line actors can manage their staff training/professional development online as well as manage face to face and blended courses on campus and (optionally) deliver online distance programmes.	Moodle Workplace Totara CSOD Crossknowledge
Enterprise e-portfolio	Content management and display products optimized to support workplace delivery, especially for apprenticeships. It supports the workflow for different types of evidence collection and submission, supervisor verification and assessor comment, as well as learner and employer tracking. Portfolios can also be used to support campus-based assessment and there are open source options available.	OneFile Mahara

⁹ Constructivism is an approach to learning that holds that people actively construct or make their own knowledge and that reality is determined by the experiences of the learner. Constructivist learning theory underpins a variety of student-centred teaching methods and techniques which contrast with traditional education, whereby knowledge is simply passively transmitted by teachers to students.

All LMSs provide basic “course management” functions – 24/7 access to course materials, user analytics, scheduling and automated reporting of test results.

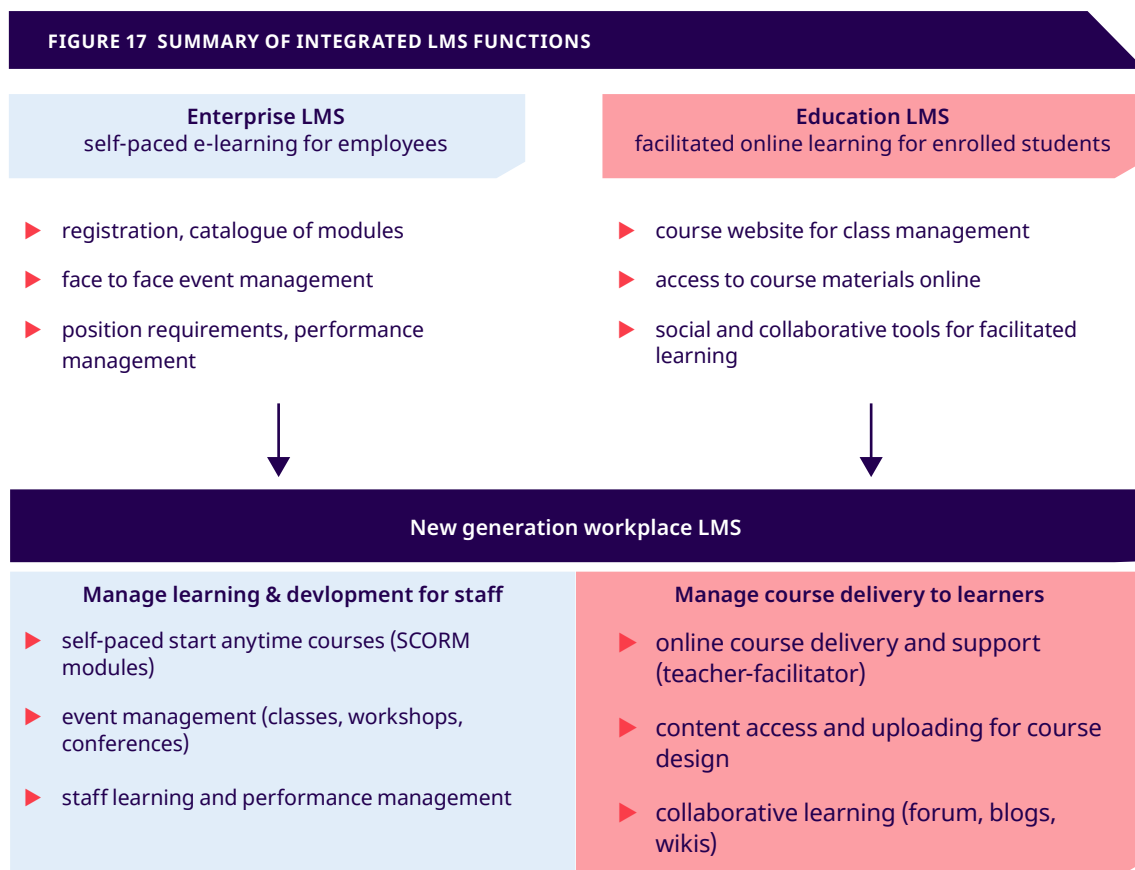
The workplace LMS

The emergence of new hybrid LMSs (including Moodle Workplace) in particular presents new options and opportunities for TVET institutes.

Self-paced learning in particular is underused in education for both course delivery and staff development. It has proven to be both cost-efficient and effective in business, government and industry where it offers economies of scale, consistency of outcomes, and reliable tracking of results. It will be a common form of training in the workplaces for many TVET graduates. While it is true that many self-paced products are of poor instructional quality there are also many examples of quality design which have achieved significant performance improvement for organizations.

The pandemic has presented institutes with unprecedented challenges to build digital capabilities for virtual work, online facilitation and learning design. The digitization of the staff capability-building (or in-service training) function itself, using a workplace or hybrid LMS, may be part of the solution.

Figure 17 indicates the dual function of the system in an education and training workplace.



Source: Authors (2021)

Adoption stages for an LMS

The implicit pre-pandemic “business model” most institutes begin with is that all teachers will continue to write and design their own courses, but they will all have to learn to “build” (or “author”) the course in the LMS as well as use the new tools to teach.




This is unlikely to be a sustainable model except perhaps for the “early adopters”, usually somewhat less than 10% of the teaching cohort. The new role expected of teachers can include aspects of instructional writing, graphic design and illustration, media development (audio and video), test design and learner analytics, as well as the widely underestimated and complex skills required to plan and facilitate effective online synchronous sessions for groups, but also the capacity to design a whole, pedagogically sound and technically executable blended learning architecture and experience.

These tasks are often initially seen as in addition to the “normal” teaching load, which can create significant industrial relations issues and highlights the importance of social dialogue between “employers” and “workers” within the education and training system. In recognition of the quantum leaps in capability required, many systems provide support and mentoring from a specialist in-house or outsourced design and development team. Sourcing and customizing available OER or other online course materials, including pre-built course shells (complete ready-to-click courses), is another option, again usually requiring specialist support.

Growth steps for teaching online

The maturation sequence (and trainer capability development guide) for an LMS implementation can be illustrated by the progressive “levels” of course delivery enabled by Moodle, the most widely used LMS in education. These stages describe the developmental pathway for an individual trainer to be able to teach effectively online, but can also be used to evaluate an institute’s readiness to support blended and online learning options for learners and clients.

FIGURE 18 WHAT CAN YOU DO WITH MOODLE?

Progressive teacher/trainer uptake of Moodle functions Moodle tool names (“modules”) shown in blue	Increasing learning delivery options
Level 4 Remote delivery 15 Provide fully online courses, webinars Virtual classroom (web conferencing service) (plugin)	Online learning 
Level 3 Collaborative group learning 14 Engage in active research, communities of practice 13 Leamer: author course Ressources 12 Leamer: use Webpage , Survey tool and Logs to study	Blended learning 
Level 2 Interactive web-based teaching & learning 11 Provide live online support with Virtual Classroom (plugin) 10 Introduce external Activies and Games 9 Add self-paced modules with SCORM , IMS 8 Combine Activies into sequences (authoring) 7 Facilitate discussion in (active) Forums 6 Use Wikis , Glossaries , Databases for collaboration 5 Use interactive Quizzes and Assignments 4 Connect your leamer group through People	Web-enhanced face-to-face 
Level 1 Basic course access & administration 3 Provide a (passive) Forum for the group 2 Publish course docs, 24/7 access (Resource , Lesson) 1 Manage online course administation (Calendar , Events)	Face-to-face

Source: Authors, (2021) based on Moodle Community materials

Level 1: Web-enhanced face-to-face

In the initial level of uptake, the LMS provides online access to existing course materials, some optional course administration features, and an online text discussion forum. In an institute-wide “roll-out” of the LMS, IT staff may play an active role in setting up and loading content to the course sites, so trainers require only basic “systems training” in using the Moodle tools initially to support and enhance their face-to-face delivery. Most institutes will provide a pre-designed course template or “shell” to provide consistent badging, navigation and presentation structure for institute courses, and so simplify the design and development tasks for trainers, as well as provide specialist support from the learning design unit. In many cases, the biggest challenge is a lack of digital documentation of existing courses, such as lesson plans, handouts, PowerPoints, workbooks, group activities and assessment tasks.

Levels 2 & 3: Blended and collaborative learning

As trainers learn to use more of the Moodle tools (Levels 2 and 3) their courses can become more “blended” as they add in more of the interactive and collaborative functions available in the LMS. This will present a significant learning curve for the majority of trainers, even if they have the necessary level of computer literacy.

Level 4: Distance learning

Fully online (distance) delivery capability (Level 4) requires the addition of a web-conferencing service, substantially more work on self-directed materials and design of the extended student communication and support services necessary for distance learning. Here is a summary of the change management drivers which are characteristic of each stage:

FIGURE 19 MANAGING CHANGE – SUMMARY OF BENEFITS FROM LMS FUNCTIONS

Stage	Institute benefits	Student benefits	Trainer benefits
Basic administrative (level 1) website for course	Visibility of learning resources (IP, quality) Foundation for future digitalization benefits (flexible delivery to new markets)	24/7 access to course materials Flexibility of communication with trainer Use social media familiarity and skills for learning	Management of course content and activities
Blended learning (levels 2 & 3) increased interactivity for on-campus programmes	Improved image (for course promotion) Improved retention and completion Improved learner analytics	More engaging and motivating learning experience Expand digital literacy skills for learning and work	New digital skills Innovation motivating for some Some time-saving (e.g. assignment management)
Distance learning (level 4) fully online capability	Extended client reach	Access to training Flexibility of time and place Build self-directed learning skills	More new skills Flexible work opportunities (home-based)

Source: Authors (2021)

The pandemic has also severely disrupted the “normal” pathway to the digitalization of course development and delivery which has been based mostly on implementation of a learning management system with the associated skill development required for trainers to learn to use the system and expand their repertoire. In effect, trainers have been required to jump directly to “Level 4”, using synchronous web-conferencing tools not designed for online teaching, and without the necessary training resources and skill development.

In this situation, it is likely that short to medium term solutions will involve significant system-level commitment to providing learning materials for online delivery, new levels of resourcing of specialist learning design and delivery units with a strong internal consultancy role at institute level, and a fresh approach to workplace training for TVET staff, to bridge the considerable capability gaps which result from further digitalization of the design, development and delivery of training programmes.

6.3 Digitalizing assessment of training

Most providers will rely on an LMS to provide a basic set of tools to create, manage and track web-based assessments, including quiz tools and an assignment upload and tracking function. The tools are valuable for managing all assessments, including on campus and blended programmes, not just for online delivery, which is effectively a special case requiring different assessment strategies. For some trainers, this facility is the most-used function of the LMS. There are other specialist tools to expand the trainer’s repertoire if they use compatible formats to load to the LMS. Together these tools are enabling streamline development of assessment, providing rapid and reliable tracking of results and accurate and automatic reporting to data control systems.

But these are business as usual issues, and the business has changed. After perhaps the core issue of providing access to computers and the Internet to learners and staff for vocational training, the most daunting challenge to delivering blended and online courses is solving the problem of assessing practical skills, especially in the trade areas, but also in many TVET training areas where practical competence needs to be demonstrated, such as hospitality. The greatest strength of the TVET system – applied learning – becomes its biggest hurdle when the face-to-face option is not available.

Stated simply, ideally and in practice, TVET students are mostly assessed by demonstrated ability to perform work-related tasks to a required standard. This usually requires arrangements to access the equipment to perform the tasks either at a campus workshop or at a workplace. How can the course be delivered online and still meet the assessment requirements?

For TVET institutes, an important key step is to break the nexus between assessment and the teacher/trainer as the assumed assessor. Competency-based training and assessment provides the essential flexibility required because, at its best, it is fully evidence-based (rather than test and assignment based), so collecting evidence is in the domain of the learner. Their challenge is to generate and collect their evidence. The assessor’s task, supported by assessment tools (such as checklists and rubrics) is to evaluate and authenticate that evidence. The trainer is just one of the possible assessors.

Digital solutions for assessment at a distance

We have identified three major digitally enabled approaches to assessment in TVET for online training that are also relevant to workplace-based training.

► **Online portfolios**

Portfolio tools are learner-centred approaches that provide the user with the capability to manage evidence of their own work and training outputs. Online tools such as One File from the UK are purpose-built for the collection and organization of evidence of outcomes in work and learning settings. It has been developed for apprentices in particular but has relevance for other learners, especially those in programs with a work-based learning component. By linking with recognized programmes and qualifications they enable simplified and integrated reporting functions, and can offer a single-point, easy to use, secure and efficient solution for assessment.

► **Smartphone video**

In settings where mobile phones are common and learners can access either their own or other devices, recording videos of practical work is a compelling solution. The logistics of uploading content and the need for authentication protocols need to be addressed, but neither is insurmountable – many LMSs are mobile device friendly and will manage the process smoothly. Some trainers under COVID restrictions have required their students to send progress report videos of each stage in a work task, which neatly captures evidence of their work/thinking process and strategy, provides authentication and shows the performance outcome.

► **Web conferencing**

The rapid explosion of the use of tools such as Skype and Zoom means that they are as familiar as Smartphones – again with the necessary brake on enthusiasm when we are confronted with the stubborn realities of the digital divide. Once the notion of 20 faces on screen with all mikes open subsides, we can only hope, the tools can be used for the repertoire of assessment processes – demonstration/observation, discussion/explanation, problem solving, summing up, lessons learnt. Group and team skills can be evidenced in well-designed structured tasks with the sessions recorded.

FIGURE 20 OTHER DIGITAL TOOLS FOR ASSESSING LEARNERS

Digital tool	Description
Management Information System (MIS)	At a system level, can be capable of tracking and verifying learning that takes place in training programmes, on the job, during and apprenticeship period, and throughout an individual's career.
Learning analytics software	Processes learner log data generated by the MIS, allowing the institution to customize learning paths that are unique to learners' learning needs, improving the experience for learners and allowing teachers to address learning gaps more effectively. Integrated in some LMSs and in most of the LXP, enabling content recommendations based on learners' profiles, interests, but also performance.
RPL assessments software	Ideally integrated at the start of units in formal courses so that learners can progress faster if they already have evidence of their skills and experience. Can be self-assessed or trainer moderated if formal RPL is required. Also available as a stand-alone process judging evidence of competence from different sources. Often also includes the use of portfolios.
Quiz software	Integrated in the LMS or specialized software that enables online and continuous assessments to be generated and results tracked.
Mobile assessment software	Enables trainers to create and administer tests to learners using digital devices, grading answers and analyzing results.
AI supported assessment software	Automates assessment of bulk assignments. A rapidly growing field.
Online question repository	Often populated with standard questions, but trainers can add their own and share with colleagues.

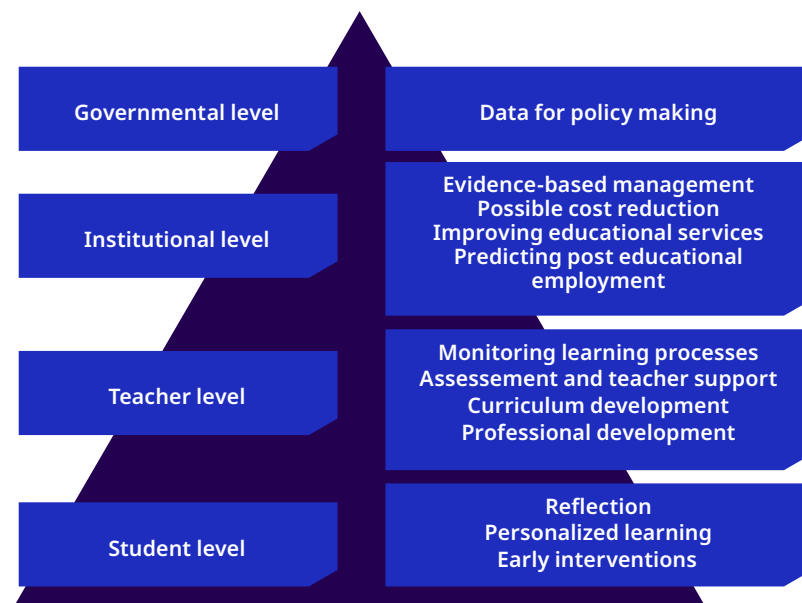
Source: adapted from the World Bank unpublished draft report (forthcoming 2021)

6.4 Learning analytics for assessing program effectiveness

Almost all the learning platforms and tools mentioned in this report automatically collect and store a huge number of learners' digital footprints, including their written texts, time spent within a task, navigation behaviour and so on. Recently, researchers and practitioners investigated if this kind of information could be used for assessing the effectiveness of a learning program or to automatically personalize the training offer with respect to the user's behaviour. Consequently, different fields of research emerged called educational data mining, learning analytics (LA), and educational institution analytics (ILO 2021 forthcoming).

Educational data mining focuses on methods for exploring data that come from educational settings and using those methods to better understand learners and the settings in which they learn. Learning Analytics (LA) concerns measurement, collection, analysis and reporting of data about learners and their context for purposes of understanding, optimizing learning and the environment in which it occurs (Kop et al., 2017). Educational institution analytics is similar to LA, but the focus is more on educational results at national or international levels. Although the interests of different users overlap, they require analytics work at different scales and at different granularities. In a recent review on the use of LA in VET contexts, Gedrimienė and colleagues (2020) show how LA could be used at the student, teacher, administrator, and government levels, considering specific VET characteristics (See Figure 21).

FIGURE 21 SUMMARY OF HOW LEARNING ANALYTICS CORRESPOND TO DIFFERENT LEVELS IN A SKILL SYSTEM



Source: Gedrimienė et al (2020)

6.5 Digitalizing design and development of training materials

The development of digital training materials to support TVET programmes is another vexed problem for national skills systems, and beyond the scope of this report to discuss in detail.

We have argued earlier that many of the lessons of the pandemic response point to the need for a centralized national approach to design, publishing and distribution of TVET learning materials. Coupled with national training standards and OER policies, TVET systems have the opportunity to improve the quality of teaching and learning, reduce the unrealistic burden of developing new non-instructional skills for trainers, and scaffold TVET trainers' work by embedding applied learning and competency-based assessment in the materials. Larger institutes with existing design and publishing expertise may be part of the solution, especially if they are centres of excellence for particular industries. The risk is that many smaller providers will feel compelled to scramble to "get our content online" to meet the very real dread of having to support more remote teaching without backup. They may feel, understandably, that they have no option, even though they lack the time, skills and resources.

But what sort of materials? What do we mean by "content"? Here are three sorts of digital training products which can meet the short-term needs of trainers and institutes. All three provide ready-to-use support materials for TVET trainers for a whole unit or course, not just scattered components they then need to build into a course. We suggest products such as these, should be the focus of planning, strategy and investment, at least for early adopters:

► **Moodle shells, or similar products**

Once a Moodle course is "authored", for example – that is, the resources are uploaded (or linked), the learning and practice activities are added (including forum questions and live classroom session outlines), and the assessment tasks designed and uploaded – the course (or "shell") can be downloaded and reused in any other platform with Moodle installed. The Commonwealth of Learning for example, makes all its Moodle-based courses available for download as an installable shell, so it can be adapted and reused by a skills system or an institute. If the course is well-designed, it not only works well for trainers and students but models good practice which can be copied. If it addresses national standards (learning outcomes), it can be used reliably anywhere in the system. It can be easily customized, to add branding and other local materials. The process has its complications with different software versions and local variations, and will need specialist technical skills, but it is achievable. This is probably the cheapest and quickest way to help trainers burdened with remote teaching make the transition to quality online learning. If they are new to Moodle, they will need some introduction to "driving" the course. If they are enthusiastic, they will probably prepare the next Moodle course themselves. If there are already other Moodle shells available from other institutes in the system, or from other countries with compatible training outcomes, or from commercial suppliers, the joy can spread. Of course, other LMS products and authoring tools offer the possibility to create, reuse and adapt content, through the SCORM (Sharable Content Object Reference Model) technology among others, that enables interoperability, accessibility and reusability of web-based learning content. But these technologies will require a relatively high level of technical expertise for early adopters in the initial stages of implementation.

► **Trainer and learner packs**

These packs can mostly be found in countries which have implemented competency-based training against national standards, so that the pack can be used in any TVET institute and meet quality requirements for delivery and for accreditation. They are mostly print-based i.e. downloadable pdfs and media files (not the interactive e-learning which Moodle or other LMSs provide).

Packs aim to provide everything the trainer needs to plan, present, assess and report a unit (or whole course). A pack will typically include:

- ▶ a learner’s self-directed **workbook** (information, exercises, assignment tasks)
- ▶ a **trainer’s guide**, with session plans, notes to guide assessment
- ▶ pre-designed **assessment tasks** (built into the learning sequence in the workbook)
- ▶ **assessment tools** (observation checklists, rubrics)

Although digitally published and distributed, the learners’ materials can be printed off for programme delivery in settings where connectivity and/or equipment are not available. Workbooks can be used as self-directed resources, as a supplement to online courses, within class groups, or as online distance materials, or a mix of these.

Packs are expensive and time-consuming to develop, and require advanced learning design and publishing expertise to be effective. Commercial products are available, some at relatively low cost and with a free to copy licence, and they can be customized for local settings.

▶ Self-paced modules

We have already described the potential for self-paced (or “e-learning”) modules for TVET staff training, but they are also useful for blended programme delivery. Most modules are developed to be “SCORM compliant”, which simply means they adhere to technical protocols which enable them to “work” with any compliant LMS, including scoring quizzes and reporting results.

Most tools used to develop the modules are designed around a PowerPoint-style slide show presentation, with screens of information followed by interactions such as quizzes and scenarios. The “authoring” software is affordable, and there are “rapid development” simplified variations available, but despite the apparent simplicity, considerable learning and graphic design skills are required to make effective modules. A central specialist unit or commercial production expertise is generally required to achieve any consistent level of presentation quality and instructional integrity.

One common strategy in enterprise training in larger organizations, especially government, is to develop self-paced modules only for key processes and major concepts, so they operate as self-assessing resources in parallel with other blended learning activities with facilitators. The TVET equivalent might be to develop modules for critical processes in each industry. The high initial cost can be balanced by the high-volume reuse of the module.

Another strategy would be to use off-the-shelf content to cover core skills or cross-cutting skills needs (such as management, or digital skills) to allow the design of new courses to be prioritized for specific needs, therefore avoiding the duplication of content that already exists. In that regard, the private sector should partner closely with national skills systems to ensure the courses are being developed in alignment with the national curriculum or standards framework.

6.5 Emerging digital technologies for TVET

Edutainment and gamification

In order to boost motivation and engagement and therefore enhance the adoption of online learning, TVET providers may want to look into the introduction of interactive elements in rather traditional top-down courses, to add more fun and entertainment in an educational and training environment (also known as Edutainment).

To do so, online learning platforms have introduced gamification in their interface. Gamified platforms use video game-based mechanisms, such as collecting points (or lives), displaying leaderboards, winning badges, or even rewards (real incentives). Another feature comparable to video games is to give access to the next level of proficiency - or to the next course in a learning path, only once the previous one has been fully completed.

Gamification of the learning environment also includes social interaction features, such as discussion threads, webinars, or notifications that enable reaching out directly to the learners and enable learners-to-learners or trainers-to-learners real time interactions.

These strategies are learner-centered and designed to enhance the online learning experience. Of course, it is critical to consider all types of learners, and how they like to learn, to make sure no one is being excluded. For example, the decision to include leaderboards – used for ranking purposes – should be made according to local (cultural) criteria and learners' profiles, in order to be aligned with their learning styles, or make sure to combine several mechanisms to satisfy the diversity of learners.

On the content side, the use of serious games has considerably expanded to enable more practical skills development in real-life, scenario-based type of situations. This type of online learning course makes it possible to apply the tactics and complexity of video games to instructional serious games. In a serious game environment, students focus on strategy, make choices and decisions, and ultimately solve problems as in real-life type of situation. Branching in online content authoring tools enable to set different scenarios and outcomes based on the learner path and choices.

Immersive technologies

TVET training institutions and WBL (work-based learning) are increasingly incorporating emerging technologies in teaching and learning, including Augmented Reality (AR) and Virtual Reality (VR). Through creating simulated environments of workplaces or other digital 3D models, AR and VR can support experiential learning that engages students and encourages inquiry and reflection.

Numerous skills sectors have applied AR and VR for teaching, ranging from landscaping to healthcare to automotive industries. For example, the Union of Metallurgy Industries and Crafts in France in partnership with EON Reality uses VR for maintenance training in metalwork. This has allowed trainees to learn in a safe environment and improved training efficiency.

S&B Automotive Academy in the UK is using spray paint simulation that help learners to understand and apply these skills in a virtual setting – receiving immediate feedback from the digital program to improve their practice – before attempting it in a real-life scenario. Another example might be a 3D model of an engine that allows students to look at it from different angles and virtually dismantle it to better grasp how it functions.

These technologies also already have been piloted or implemented in TVET programmes in African countries where, for example, VR has been part of forestry training in South Africa to learn how to use a chainsaw, enabling overcoming the local skills shortage, or used in order to improve and modernize welding training in Morocco at the [Centre Marocain de Recherches Polytechniques et d'Innovation](#), among many other examples. Augmented training on agricultural machinery is another relevant example of successful immersive training, as the technology enables trainees to familiarize themselves with farm machinery without having to operate it in the actual sense.

Technologies are becoming easier to handle and, as this use case of [Remote Virtual Training - EON Reality Baker College](#) shows, designing a more interactive and immersive lesson is now possible without a high level of technical expertise.

There are several key benefits of using AR and VR for skills training:

- ▶ support students to understanding abstract concepts through investigating 3D models
- ▶ explore workplace scenarios and practices in a safe way by eliminating real-life hazards
- ▶ foster innovative approaches, exploring areas you would not try to explore in a real-life environment
- ▶ contextualize classroom learning with real-life work environments
- ▶ increase student engagement and encourage hands-on learning
- ▶ produce cost-savings and ensure a more sustainable training approach in many industries in comparison to equipment and raw or industrial material costs
- ▶ reduces time spent in training
- ▶ include learners that may not have access to workplace learning or industry-relevant equipment.
- ▶ add attractiveness for training in occupations that might traditionally be gender sensitive

Other case studies, such as an AR welding programme at [Mid-Kent College in the UK](#), or AR engine operation and maintenance at [Selam Vocational Training Centre in Ethiopia](#), also note that the use of augmented reality allows students to learn from failure quickly; opens up access to younger learners because of reduced safety concerns; allows learners to repeat tasks to master skills quickly; and can improve inclusion of those with lower literacy skills or language barriers.

Noted restrictions on use of AR and VR systems in TVET include cost as they can be expensive and may cause students to suffer from dizziness.

Artificial Intelligence

Artificial Intelligence (AI) is also increasingly being incorporated in TVET. A key area is in student feedback and assessment. When integrated into an LMS or AR/VR, AI can use the data from these platforms and technologies to provide personalized and rapid feedback on student learning. This assessment capability may give students more detailed feedback than they would otherwise receive from an instructor. It can also be applied to identifying at-risk learners and offer more consistent assessment by reducing reliance on a trainer's judgement.

Another area where AI is applied in teaching and learning is in student support. Chatbots – or bots – can be used to answer common student questions. For instance, upon noticing that students ask the same questions year after year in successive cohorts, a professor of Interactive Computing at Georgia Tech in the United States built an AI-bot named Jill Watson to act as a Teaching Assistant. Jill Watson answers questions in the class LMS, continually adding to its database of questions and reducing the workload for teaching assistants. Jill Watson has been in use since 2019 when students were unaware that it was an AI powered chatbot, not a real-live teaching assistant, until the end of their semester. The bot is built on the IBM Watson AI platform – hence the name!

AI is also more and more used across sub-systems, in the form of interoperable chatbots or search engines, to ensure the learners can find opportunities for formal or informal skills development across these subsystems, and therefore provide a more seamless experience and access to the resources they need. For example, when a learner has a question on “impactful communication”, he or she would have a search bar available in any work environment (LMS, intranet, shared workspaces, or even office tools), and the result page would come up with resources that could be included in any of these work environments and therefore include both formal training resources on impactful communication, but also other types of resources or information that could be useful, related to the key words entered in the search bar.

Other applications of AI include anti-plagiarism software, teaching administrative tasks (such as scheduling), real-time translation, and student engagement. There are, however, ethical concerns to be thought-through when integrating AI in teaching and learning. This includes concerns over student data usage and boundaries of use in teaching environments. Institution and teacher capacity to implement AI is also a limitation.

6.6 Digitalizing quality assurance of providers and programmes

Quality assurance of providers and programmes is usually the responsibility of a central national agency and is highly dependent on effective digital systems to gather reliable data, remind and encourage providers to keep their data current, and establish supportive communication channels with providers.

Quality agencies are increasingly moving from a traditional inspectorial role to a more proactive, collaborative and supportive relationship with providers, so the agency shares accountability for achieving quality levels, not just reporting them.

Providers are also investing in enhancements to online assessment, whether for live remote proctoring or for secured self-paced online examinations, providers have developed robust tools to enable identity authentication, secured environments for test takers as well as enhanced data privacy. This is also key in ensuring quality throughout the learning, assessment and certification cycle.

FIGURE 22 DIGITAL TOOLS FOR QUALITY ASSURANCE OF SKILLS SYSTEMS

Digital tool	Description
National Management Information System (MIS)	Usually proprietary data management that enables data sharing between departments, promotes integration between systems, reduce data inconsistency, improve data access for users, and accordingly assists accurate decision-making. Can be a standalone suite of applications that provides several services, or a solution that integrates with existing technology.
Indicators, dashboards, and performance tools	Focus on presenting high-level performance-related data in a visual format to improve understanding. Can include capabilities to collect this data (by data import, entry or by automated surveys).
Online survey tools	Can provide feedback on the skills system from a diverse group of people. Provide a convenient and cost-effective means of conducting monitoring and evaluation, promoting strong feedback loops.
Quality Assurance Portals	Provide easy one-stop access to multiple resources about quality assurance, regulatory documents, frameworks, and quality assurance agencies.
Integrated business planning platforms	Enable distributed and continuous planning by using analytic technologies and interactive planning tools. Especially suited to highly collaborative processes such as industry standards development and updating.
Quality Management Software	Allows providers to manage quality assurance, compliance, and accreditation on a single platform. This enables QA-related information to be easily shared and processes to be automated and standardized, enhancing efficiency and transparency.
Interactive self-assessment toolkits for institutions	Provide accessible benchmarks against which institutions can measure themselves and identify areas for improvement.
Statistical and Qualitative Data Analysis Software	Can analyse unstructured text, audio, video, and image data from a variety of sources such as interviews, focus groups, surveys, social media, and journal articles. Saves time during the QA process and allows data to be collected from multiple sources.
Reminder Systems	Used to set reminders to ensure accountability and task completion, track performance and identify areas for improvement. Often integrated in composite tools.
Knowledge-based systems (standards)	Tools which classify and categorize standards documents and cross-check during curriculum development to ensure better alignment.

Source: adapted from World Bank guide (unpublished)



6.7. Implementing Digitalization in skills development, certification, and recognition

Key implementation guidelines

Digitalization in skills development, certification, and recognition

- ▶ While implementing or consolidating digitalization of learning management for course delivery, TVET institutions should consider new digital options to support the whole learner experience, including: pre and post course functions such as learner engagement, partnerships with employers, uptake of skills in the workplace, and improving graduate employability.
- ▶ Inform training offers digitalization priority setting consulting closely with LMI, employers' organizations and the private sector, to ensure transformation is demand-driven, according to specific requirements of the local labour market.
- ▶ Refer to national strategies (such as Digital or Green), as well as to Sector Skills Councils (or equivalent) to inform decision-making on priorities. This will also enable finding more support when it comes to implementation.
- ▶ Invest in long-term solutions, and not quick-wins, proceeding with a thorough needs analysis, and including IT teams in the early design of online solutions to make sure they support the choice of efficient and inclusive solutions, but also support implementation and agile evolution of such solutions.
- ▶ Define upstream the KPIs you need to be measuring and comparing in a data-driven approach (using learning analytics), to make sure you then opt for tech-enabled solutions that allows for such measurement, analysis, and comparison among systems and solutions.
- ▶ Review current or legacy approaches for assessing practical skills and re-design them as online-friendly evidence-based assessment tasks using digital tools such as e-portfolios, learner-generated video and web-conferencing, especially in workplace settings.
- ▶ Provide clear guidelines and solutions to implement and evaluate a national learner-centered approach to blended learning.
- ▶ Expand institute-level support and scaffolding services to assist trainers to access quality digital learning materials, re-purpose exemplar unit and course designs, and rework generic session plans to embed quality practices in live online classes.
- ▶ Ensure that all TVET providers have the skills and resources to support, facilitate, and monitor the outcomes of a blended approach to skills development, and that individuals can develop the appropriate skills and attitudes, to engage in this new teaching and learning experience.



Country examples

Digitalization in skills development, certification, and recognition

National online learning platform

Senegal

[Online Training Platform](#)



E-jàng: Online learning platform

As a response to COVID-19, the Ministry of Employment, Vocational training, apprenticeship, and occupational integration (MEFPAI) developed a national online learning platform called E-jàng. The online platform contains multiple online courses, including apprenticeship ones.

Blended learning courses

Philippines

[TESDA Online Program](#)



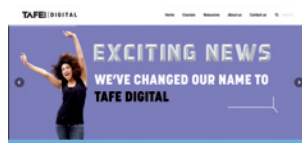
Free online skills training courses

Free, flexible online training courses offered by the Technical Education and Skills and Development Authority (TESDA). Launched in 2012. Promotes blended learning with practical skills training using equipment in training centres.

Online training using AR/VR

Australia

[TAFE Digital](#)



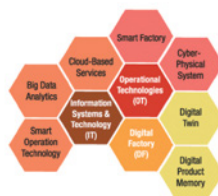
TAFE Digital

TAFE Digital is part of TAFE NSW, the largest online education provider in Australia. TAFE Digital provides access to high-quality online training for nationally recognized qualifications. Over 250 current and industry relevant courses across the range of modern industries are offered using the latest technologies in multi-media, including virtual reality (VR), augmented reality (AR) and simulation exercises, to provide digital practice for hands-on skills.

Blended learning for Industry 4.0 skills

Malaysia

[Smart factory competency training](#)



Smart Factory 4.0

The Malaysian Smart Factory 4.0 programme offers smart factory competency training through hands-on and online/remote learning approaches, ideal for relevant skillset and talent development towards an Industry 4.0 ready workforce in Malaysia.

Offered by the Selangor Human Resource Development Centre, a not-for-profit, industry-driven training and talent development centre.

Case studies on technology for employability

UK JISC

[Technology for employability](#)



A study on the opportunities offered by institutions and the role of technology in maximizing the effectiveness of those opportunities.

It provides examples of effective practice, presents a vision for technology supported practice, and highlights the current issues and challenges faced in achieving that vision.



Models and guides

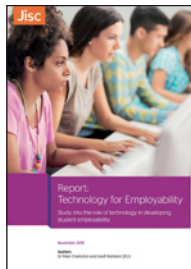
Digitalization in skills development, certification, and recognition

<p>Integrating technologies into TVET</p> <p>Promoting quality in TVET using technology</p> <p>UNESCO-UNEVOC</p>		<p>A guide to integrating ICT into TVET covering skills and competences requires, challenges for teachers, enhancing pedagogy, institutional support and limitations of ICTs.</p>
<p>Integrating technologies into TVET</p> <p>Innovating Technical and Vocational Education and Training: A Framework for Institutions</p> <p>UNESCO-UNEVOC</p>		<p>This practical guide provides a systematic, institution-wide, measurable and evidence-based methodology that enables TVET institutions to streamline innovation into their strategic planning, products and services, ecosystem engagement, and teaching and learning processes. Provides nine case studies of innovative practice in TVET.</p> <p>Stresses the importance of keeping learning attractive for students in a digital age and providing them with market-relevant skills.</p>
<p>Methodology and for e-learning design and delivery</p> <p>E-Learning methodologies and good practices</p> <p>FAO e-learning Academy</p>		<p>This guide intends to provide guidance on designing and developing e-learning-based solutions for trainers and instructional designers who are new to e-learning design. The guide also provides basic concepts and information on the processes and resources involved in e-learning development. The content of this guide is based on consolidated instructional design models and learning theories and incorporates more than 15 years of experience of the FAO e-learning Academy, including work practices, standards and quality criteria adopted for the delivery of learning programmes and self-paced e-learning courses in development contexts.</p>
<p>Artificial Intelligence</p> <p>Understanding the impact of AI on skills development</p> <p>UNESCO-UNEVOC</p>		<p>This guide aims to assist TVET institutions in developing an understanding of the current and future importance of AI and begin to incorporate its use into their planning. The guide notes that in addition to its impact on the education sector, AI is substantially altering labour markets, industrial services, agriculture processes, value chains and the organization of workplaces in particular.</p>
<p>Embedding digital technologies in institutions</p> <p>SELFIE</p> <p>European Commission</p>		<p>SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies) is a free tool designed to help educational institutions embed digital technologies into teaching, learning and assessment. SELFIE has a strong basis in research.</p>

Technology for Employability

Toolkit

JISC



This study starts from an idea that technology for employability can provide many potential benefits for students, institutions and employers. It draws on 20 cases studies from UK institutions and found technology being used for:

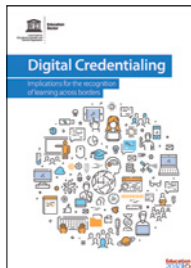
- Technology-enhanced authentic and simulated learning experiences
- Digital communications and engagement with employers including development of digital identity
- Technology-enhanced lifelong learning and employability
- Technology-enhanced employability skills development
- Employer-focused digital literacy development

Recognizing skills across borders

Digital Credentialling

Implications for the recognition of learning across borders

UNESCO



In a context where the labour market and educational and training systems are increasingly internationalized, the increased mobility of people and jobs have great implications on the ways that skills and qualifications are recognized, validated and accredited across borders. This report explains how digital technologies are transforming education and training systems and building new credentialling methods and systems that can capture, recognize and validate learning outcomes in new ways.



7

► 7. Improve access to skills development and the labour market (Building Block 4)

Overview

In a lifelong learning perspective where access to skills development is a right for all, increasing access to skills development opportunities is a fundamental goal and responsibility of national TVET and skills systems, and is particularly important for marginalized and disadvantaged groups. The COVID-19 pandemic resulting in extended periods of lockdown and social distancing has forced, on the one hand, education and training institutions and systems to make their way into online and distance learning, increasing substantially the use of digital tools for teaching and learning, and thus catalysing the innovation capacity of skills development providers, pushing them to transform their courses into blended or online activities. On the other hand, the race to online and distance learning has also contributed to widen inequalities, since learners from poorer backgrounds, in more remote areas, migrants and other disadvantaged groups had less access to the needed equipment and connectivity and hence were less able to follow distance and online learning. Even when people are connected, disadvantaged learners have much higher chances of dropping out of distance and online courses as they are underprepared to the use of technologies, and sometimes lack the appropriate equipment to make use of them.

Policies, strategies and processes which improve access are embedded in many aspects of the system. In this building block, we focus on TVET and skills system components where digitalization can have significant impact in increasing access to and participation in training programmes and providing recognition of skills.

Key components to improve access to skills development and the labour market through digitalization

7.1 Main challenges to access and participation

Digitalization of TVET and skills systems brings multiple challenges. First and foremost amongst those is the digital divide and the uneven access to equipment, tools and skills it implies. The digital divide is also reflected in:

- Lack of or poor quality of internet infrastructure;
- Non affordable access to the internet;
- Need for a minimum bandwidth¹⁰ to allow efficient online and blended learning experiences to happen;
- Lack of access for learners to basic digital skills training, online digital application and platforms and learning spaces where they can be accessed;
- Need for utilization of inclusive digital and analogue technologies for distance learning and support;

¹⁰ The Broadband Commission for Sustainable Development's Working Group on Digital Learning recently published (September 2021) report: [Connecting Learning Spaces: Possibilities for Hybrid Learning](#), and in line with the Giga initiative, recommends that the required internet speed for a school equals a minimum of 20 Mbps, and certainly no less than 10 Mbps.

- ▶ Necessity to support teachers and trainers to operate in the new environment, as well as develop their capacity to support the learners in their new experience;
- ▶ Need for professionalization of teachers and trainers in the new online or hybrid teaching environment, with the new roles and responsibilities that arise from this;
- ▶ Need for guidance to education and training institutions and staff to identify and chose the appropriate online tools to serve their local needs, in a sustainable, long-term perspective;
- ▶ Provide necessary support to learners (both digital skills and attitude) who may, for lack of motivation or understanding of the added value, drop out or not participate, if underprepared to utilize such technologies, even though they have access to it;
- ▶ Provide support, career guidance and digital skills development for learners;
- ▶ Increase distance and short course learning options for core, entrepreneurial and employability skills to vulnerable groups and individuals;
- ▶ Strengthen systems for the recognition and validation of digital learning;
- ▶ Increase investment in digital solutions for practical skills development; and
- ▶ Improve social dialogue and coordination amongst education and training institutions, employment services and local authorities.

7.2 Possible benefits of digitalization

Whenever considering those above-mentioned challenges, mainly including the need for adequate infrastructure, skills, and attitudes, the use of technologies for teaching and learning should entail the following benefits:

▶ Enhanced learner experience and quality of learning

The integration of technologies before, during and/or after learning moments has the capacity to enhance the quality of learning, putting the learner at the centre of the learning experience, in a learner-centric approach. For example, technologies can supplement a physical classroom environment to make it more interactive (using a smart whiteboard to present a quiz to the classroom, for example), or be used as a way to remotely deliver skills development opportunities or assessment in a self-paced mode, before or after synchronous interactions with the teacher/trainer in a group-based environment. The possibility to deliver self-paced modules through online solutions also has the advantage to limit and prioritize time spent in group-based courses (physical or remotely) for more experiential, emotional and practical learning experiences.

When used appropriately, according to the targeted group profiles, features such as gamification have the capacity to foster learners' engagement in the learning process. Interactivity enabled by EdTech solutions also enhance the teaching and learning experience, enabling less top-down, lecture-type courses, and more interactions between the teacher or trainer and the students, but also in between the students themselves (in a peer-to-peer type of approach). Both gamification and interactive features, used in or outside the classroom, have the capacity to engage and motivate learners who, in a more traditional physical space, would normally have less or not have participated in the learning process (for lack of self-confidence, for example).

Technologies and digitalization applied to learning (such as AI or machine learning), can definitely be seen as enablers of improved pedagogy and andragogy using adaptive technologies to serve personalized learning paths, according to the learners' pace, level of proficiency or specific interests – which is scarcely possible in a group-based face-to-face environment. Although this requires autonomy, motivation and guidance from teachers, it can definitely improve the relevance of learning content and offer a more personalized learning experience.

On the teaching/training side, and as long as tools are selected appropriately, the use of technologies can enhance the teaching experience and save some time for the teachers and trainers. Indeed, delivering some of the courses in a self-paced mode, but also making use of data that can be retrieved from the online solutions enables the educational staff to make the most out of tech-enabled solutions. Data provided by online tools enables trainers and teachers to get more feedback from the group or individuals, therefore giving them more insights in order to monitor and evaluate more precisely the students' progress, proficiency, their attitude and behaviour towards delivered content, thus continuously adapt their approach and content. Again, this requires adapted training for teachers and trainers to make the appropriate use of such opportunities given by EdTech solutions.

That said, support and training has to be provided to teachers and trainers in their new role. From a lecturer type role, they become *curators* (of existing resources), *architects* of the new learning experience, and *designers* of the appropriate digital or blended experience they will deliver. Digitalization of content has to be taught, as it is not only a matter of taking online face-to-face slide decks, but really to transform the whole learning experience making the most appropriate use of EdTech solutions to serve this, in an inclusive and sustainable manner. The new learning experience has the potential to increase learners and students' engagement, as long as it is appropriately architected, and that tools or solutions that are being used are accessible to the targeted groups.

Teachers and trainers also have an increased role to maintain learners' participation and engagement in the new online or hybrid learning experience as technologies also have the capacity to increase students' drop out. To avoid this, teachers and trainers need to be aware of the fact that they need to maintain interaction with their students, even outside of synchronous learning moments they spent with learners, through social interaction features such as adequately moderated learners' communities or forums, but also through direct interaction with learners through emails or via the phone, for example, to provide the necessary messages that will boost their understanding, motivation and engagement. For this, teachers and trainers need to develop their communication and socio-emotional skills to make sure they can support learners in this new learning experience.

In order to benefit all, and not exclude further vulnerable groups, the digitalization decision-making process should always consider the local environment and inclusively serve the needs of all individuals within a targeted group.

► **Flexible delivery options for extending access to training and learning opportunities**

In many TVET and skills systems, hybrid or distance delivery capability is considered to be a key part of opening up access to training opportunities, especially for remote or marginalized communities. Digitalization can provide enhanced reach, efficiency and communication options for traditional print-based correspondence systems, as well as making online learning an option where connectivity and equipment are achievable.

However, technology applied to teaching and learning should ensure equitable and inclusive access for all, putting the needs of the most vulnerable at the heart of strategies¹¹, and design of tech-enabled skills development tools should include such principles from the design stage. In the report on [Reimagining Education: Technology and Innovation in Education at the World Bank:](#), the World Bank advocates

¹¹ Texts adopted - Resolution I: Resolution concerning a global call to action for a human-centred recovery from the COVID-19 crisis that is inclusive, sustainable and resilient (ilo.org)

attention to five key principles when education systems invest in EdTech. And among those five principles, Principle 2 advocates for “**Design and Act at Scale, For All** - The design of EdTech initiatives should be flexible and user-centred, with an emphasis on equity and inclusion, in order to realize scale and sustainability for all.”

The online ATAWADAC principle (Any Time, Any Where, Any Device, Any Content) is also one to consider a guiding principle to make sure skills development opportunities and resources can be accessed in an inclusive manner.

Also, in a learner centric approach, digitalization makes it possible to consider learner’s profile, and that, not only related to their access or equipment capability, but also according to their learning styles and preferences. Indeed, digitalizing and adopting multi-modal approaches to the way we teach and learn, also makes it possible for learners to choose, among available resources, the ones they’d rather prefer to develop their skills. In that respect, the ATAWADAC approach should also be looked into.

Digitalization also facilitates centralization and sharing of training resources (whether they are transversal off-the-shelves ones or sector or occupation-based), allowing the possibility for inspiration and/or reuse of already existing materials, that can be further adapted or customized according to local specific needs. Online communities can also foster cooperation and collaboration at a national, regional or even international level when it comes to develop new skills and attitudes towards digital and hybrid ways of teaching and learning.

► **Facilitated Recognition of Prior Learning**

According to the ILO’s definition¹², Recognition of Prior Learning (RPL) is a process of identifying, documenting, assessing and certifying formal, non-formal and informal learning outcomes against standards used in formal education and training. Thus, RPL provides an opportunity for people to acquire qualifications or credits towards a qualification or exemptions (from all or part of the curriculum, or even exemption from an academic prerequisite for entering a formal study programme) without going through a formal education or training programme. RPL is a process, which, in short, relies on an assessment of learning outcomes to formally recognize competencies. Through RPL, learning outcomes are assessed, not the learning itself (or where or how it took place).

In practice, a robust and affordable RPL policy and process is not easy to achieve in national skills systems. Fair and valid assessment can be time-consuming and costly (e.g. availing required equipment, transport to assessment centres or workplaces where assessment are undertaken), and collecting and evaluating evidence of competence can become cumbersome (e.g. through portfolios containing work samples, letters of recommendation, work contracts etc.).

Digital solutions are having a critical role in making skills recognition systems more efficient and affordable. Some countries are using digital tools such as smart cards, digital wallets and online portfolios to support individuals to store evidence (such as credentials, work records, videos of work performed, photos of work samples, digital badges, etc.) linked to work experience and learning in a wide diversity of contexts. e-RPL can also provide more than online evidence of work experience and learning outcomes and can include online platforms that deliver information and services such as distance counselling, distance assessment and online skilling opportunities linked to RPL achievement. Portfolios and similar tools are used in career guidance processes and can provide rich referencing of individuals to RPL processes, proving particularly useful in addressing vulnerable groups’ needs, such as refugees and low skilled workers. Many of these approaches have evolved into specialized RPL tools that operate across distinct services and systems, based on common competence frameworks.

¹² Skills: Recognition of Prior Learning (RPL): Learning Package (ilo.org)

► **Integrated approach to skills development and employability**

Digitalization also has the capacity to build interconnections between different functions or ministries, and eventually systems, that would traditionally more or less operate separately and sometimes work in silos.

Some online solutions (hybrid between education and employment) provide individuals with more integrated solutions that enhance access to the labour market.

Rather than focusing only on skills development and the learning experience, such solutions enable:

- the identification of skills individuals have previously acquired through formal, non-formal or informal personal or professional experiences with links to existing national, regional or international standards;
- the identification of job seeker interests and aspirations matched with possible relevant occupations;
- the identification of potential skills gaps between the individual's profile and required skills of relevant occupations;
- information and options for learning to bridge this gap; and
- information on job vacancies and the ability to apply.

Such technology-enabled tools, that should be complemented with human interaction and digital literacy training to maximize adoption and usage. Such systems also have the benefit of being able to include additional features such as support for the recruitment process, the development of core and employability skill including job search skills to create a resume/CV, or interview preparation.

The joint action of different ministries, government agencies and key private stakeholders such as private recruitment agencies should integrate data and information to build more integrated training and employment databases, thus strengthening LMIS and improving career guidance support for individuals.

Leveraging multiple communication channels, including online and more traditional means such as newspapers, TV, or radio channels, is also key to giving visibility to such tools and raise awareness on the importance of career guidance and development.

7.3 Possible solutions for disadvantaged groups

The pandemic has exposed the social disparities in access to infrastructure, digital literacy, equipment and devices in many countries. While the fundamental resourcing issues reach wider than the education system, investment decisions in the education and training system need to take account of current accessibility levels of learners and focus on those investments that benefit disadvantaged learners and help bridge the digital divide rather than reinforce it. However, the response has revealed a range of strategies to provide access to remote learning resources for trainers and students.

When talking about delivering content, alternative content format or modalities, as well as distribution channels should be part of longer-term systemic strategies, which will be required to address the challenges. Indeed, it is critical that learning modalities are adapted based on specific local contexts.

Using technologies to design and deliver training should include considering, anytime it is relevant, alternative channels to distribute learning opportunities, such as using TV or radio channels as skills development broadcast solutions, or providing offline printed materials or handbooks whenever needed.

In order to enable online delivery to populations where connectivity is low, a lot of EdTEch solutions are designed so content and courses can be consulted offline, with no internet connection, or offering downloadable content that can be consulted on any device, anytime.

Some technical solutions are enabling wireless connectivity wherever (robust) infrastructure has not been implemented yet, thus making access to online resources possible even though connectivity is not stable.

Other solutions such as the possibility to transform e-learning SCORM packages into .exe format or even pdf files can be implemented whenever connectivity is too low to support full content of more sophisticated animated videos or e-learning modules.

When context makes it possible to provide learners with mobile devices, mobile-ready content or mobile applications is also one of the major enablers to foster access to online and distance learning opportunities. Not only because the use of mobiles for any type of daily life use is widespread – and therefore learning experience is embedded in a daily life habits, but also because it means that skills development is portable and mobile, outside of the classroom or initial or traditional learning environment.

One major benefit of mobile learning goes to vulnerable groups such as migrants as taking their learning experience online on mobile avoids discontinuity of the learning process when returning to their home countries, which can also be considered a benefit for the country or community of origin.

► Low to no-technology alternative solutions

The World Bank has created some [Knowledge Packs](#), providing guidance on how and when to leverage alternative distribution channels in contexts with low or no connectivity, and when devices are not available.

Figure 23 below lists a few possible solutions for low connectivity or no equipment contexts:

FIGURE 23 ALTERNATIVE LOW TO NO-TECH SOLUTIONS

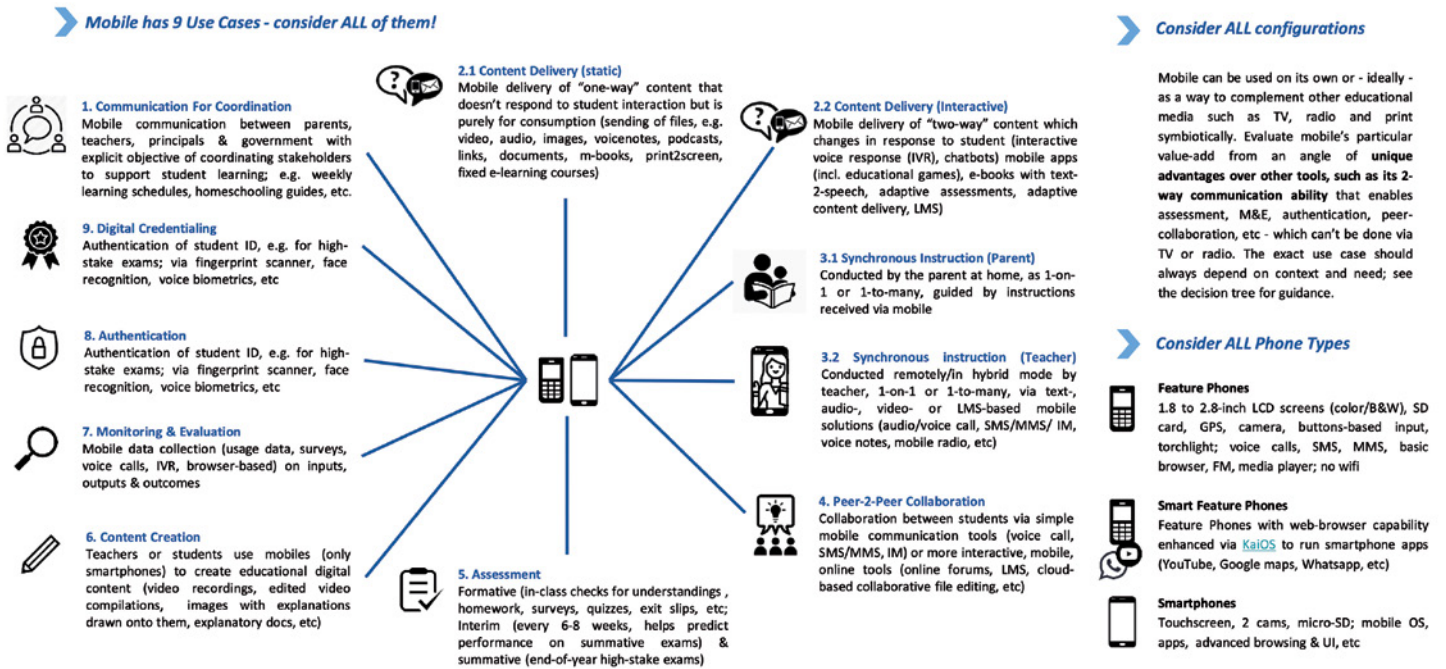
Possible low to no-tech solutions ¹³	Solutions for low connectivity	Solutions when equipment is absent
Leverage local newspaper to include education and training content, and/or motivational messages to the targeted groups.	✓	✓
Leverage local broadcasting media to provide educational programmes and set up a remote learning model using Radio or TV educational programmes. They can be coupled with complementary resources shared through online channels such as social media or messaging applications, whenever available.	✓	✓
Make the best of TVET institutes, schools, educational or community centres, where connectivity and equipment/devices are available to allow learners continue learning outside the classroom.	✓	✓
Make use of offline, printed materials to be sent to learners whenever possible. When not possible, explore the possibility to share or deliver educational resources through other communication channels such as social media or messaging applications such as WhatsApp.	✓	✓
In remote or rural areas, with low or unstable connectivity explore the possibility to create local partnerships with mobile operators, telecom providers, and other providers to increase access to digital resources through enhanced connectivity and equipment/devices such as computers, tablet or mobile phones learners can use during the course of their training programme.	✓	✓
Upload students' books or guides, or resources pdf in an online shared drive or other type of online storage facility.	✓	
If technology allows, use online delivery of educational resources such as social media channels or WhatsApp.	✓	
Make use of low bandwidth (including offline) solutions. Most EdTech providers design their solutions to be used offline, with downloadable content.	✓	
Use technical solutions such as the Raspberry PI, enabling wireless connectivity wherever (robust) infrastructure has not been implemented yet.	✓	
Leverage the possibility to transform SCORM packages into .exe format or even pdf files so content can be accessed in a lower quality format, whenever connectivity is too low to support animated videos or e-learning modules.	✓	
Design or use mobile-ready online content or applications to maximize usage for learners who might only be equipped with mobile phones. This also has the benefit for vulnerable groups such as displaced populations to maintain their access to skills development, even beyond their host country and back into their country of origin.	✓	
Provide the necessary guidance (skills, attitude, and detailed instructions) to access and use the tools and resources you can provide depending on the local context (on- or offline) to facilitate the learners' experience.	✓	✓

Source: Authors (2021)

13 Synthesis based on the World Bank Guidance **Note:** Remote Learning & COVID-19, [World Bank Document](#)

14 The World Bank has put together a document listing 10 practical actions taken mainly by Ministries of Education from different countries such as South Africa, Kenya, Turkey, Oman, or Egypt, to improve connectivity and support learners to get and stay online during the pandemic.

HOW CAN WE LEVERAGE MOBILE FOR EDUCATION?



The COVID-19 pandemic has left more than 1.3 billion children out of school with **more than 80% countries mandating school closures** [1] [2].



With the length of school closures uncertain, countries are attempting to support learning of students out-of-school and in almost all cases, are turning to the use of educational technology (**EdTech**) to support remote learning. [3]



Middle- and high-income resource contexts in countries are **deploying online learning systems** (e.g. Learning Management Systems, Video Conferencing) with some also **using broadcast media** (e.g. television, radio, mobile phones) and **print media** as supplementary channels of delivery. However, online learning has exposed huge digital divides within and across countries. [4]



Low-resource contexts in Least Developed Countries (LDCs) and Fragile, Conflict and Violence (FCV) affected environments lacking the necessary connectivity and devices are **deploying alternative EdTech tools** such as educational television, radio, mobile phones supported by print material. [5]

► Assistive technologies for learning

As a principle in education and training, learning resources should be made inclusive and accessible for all students and trainees. Digital technologies can assist in supporting trainees with a range of different needs and abilities. Trainees with disabilities face obstacles even with in-person instructor-led training. A virtual learning environment might remove the barrier of travelling to a TVET institution but it requires specialized assistive technology. This might include screen readers to read the contents of a web page out loud, magnification software, live captions generators, keyboard navigation tools and touchscreens. Other technologies include text-to-speech software and assistive listening systems. Assistive technologies (AT) are tools that can help improve the learning experience of persons with disabilities (PWDs) and enable them to participate in formal TVET. These include devices or software that help with vision impairment, speech, mobility, hearing impairment, cognition and general communication. The WHO has developed a list of priority ATs to help guide national policy development and procurement strategies. Provision of appropriate ATs for learning and work can empower PWDs to earn a livelihood and obtain greater independence.

Limitations on ATs include cost as they are often expensive to purchase and maintain, and require support systems for users. Often persons that do receive ATs abandon them because of maintenance issues or lack of training and support. In order for PWDs to benefit from ATs, systems need to be established or improved to identify, purchase or produce, distribute, and support their use.

Mobile phones – which have a wide penetration in low and middle-income countries – now have a range of functions or software that can provide affordable support to learners with disabilities. For instance, applications can be downloaded on smartphones, such as text-to-speech or screen readers, that can assist learners with visual, hearing or cognitive disabilities. They can also be connected with external devices to enhance operation of other ATs. Mobile apps, such as PicSeePal or CBoard, offer augmented and alternative communication to help with speech and learning. CBoard, for example, is an open-source and free app that contains thousands of symbols and pictures, which can be arranged and even printed to help PWDs with communication.

In addition to cost, some challenges with digital ATs are that they are in a limited number of languages or cannot be used offline. Developers are working to address these issues, such as NV Access, which is supporting local partners to translate the open-source screen reader software NVDA into other languages. As well, teachers need to be trained on how to use ATs to support children with disabilities in their classroom.

AT2030 (2020) – a global initiative to provide assistive technologies to half a million people by 2030 – identify four important elements of digital ATs:

- Accessible devices
- Accessible software
- Accessible content
- Accessible platforms.

Unwin et al. (2020) argue that more digital technologies need to be universally accessible in their design, as this would reduce the cost-burden for PWDs and governments.

The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) calls for inclusive education and training, and in order to help ensure the realization of this right “State Parties shall take appropriate measures to employ teachers, including teachers with disabilities, who are qualified in sign language and/or Braille, and to train professionals and staff who work at all levels of education (...)”.

State Parties shall also “(...) undertake or promote research and development of, and to promote the availability and use of new technologies, including information and communications technologies, mobility aids, devices and assistive technologies, suitable for persons with disabilities, giving priority to technologies at an affordable cost,” as well as “(...) promote access for persons with disabilities to new information and communications technologies and systems, including the Internet,” and “(...) promote the design, development, production and distribution of accessible information and communications technologies and systems at an early stage, so that these technologies and systems become accessible at minimum cost.”¹⁵

Adopting Universal Design for Learning processes when designing learning resources for inclusion is an important approach. This includes following [Web Content Accessibility Guidelines](#) from the World Wide Web Consortium in the design on web-based learning content. In that respect, some countries have integrated a national accessibility law, such as the [European Accessibility Act](#) for Persons With Disabilities and elderly people.

7.4 Referral and outreach systems

In Building Block 3 (Training and Assessment) we looked at the HOLON-IQ “digital landscape” model.

Much of the power of the model is in demonstrating the significance of the processes before and after an educational programme is delivered, processes which are sometimes undervalued as part of “administration”.

This approach emphasises both the learner-centred goal to provide support and assistance throughout the full learning-and-working journey, and the business-oriented need to recruit, engage and retain learners and clients through the professionalism of the organizational processes.

The HEDC Framework can help to identify some of the processes which emerging digital tools or services help to define and to facilitate, and which are predicted to play a part in educational organizations in the short to mediate term, including those that improve access and participation in the broadest sense through enhanced outreach. Together they can provide a detailed and evidence-based preview of the next generation of digitalization in education, and for TVET providers and skills systems too. Some dominant themes in the “new” digital processes are:

- ▶ personalization
- ▶ participation and engagement
- ▶ data and analytics
- ▶ multiple delivery modes
- ▶ integrating work and further learning
- ▶ client-centred services external partnerships and relationships

These provide an insight into some of the specialized digital solutions now available for sharing data, building relationships, communicating between providers and employers, and locating learners in a more cohesive pathway in their engagement with the skills system and training opportunities.

¹⁵ UN CRPD Article 4 – General Obligations

7.5. Implementing Digitalization to improve access to skills development and the labour market



Key implementation guidelines

Digitalization to improve access to skills development and the labour market

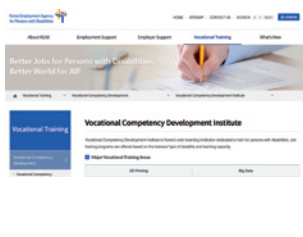
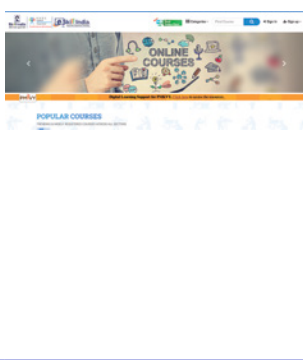


- Inform the offer of digitalized training products and services with comprehensive studies of the targeted groups or population capabilities (infrastructure, equipment, and connectivity), as well as skills and attitudes, to ensure access and uptake of such opportunities.
- When adopting flexible and blended learning approaches embed robust non- or low-tech alternatives at the programme design stage, to avoid further disadvantage for those face barriers related to infrastructure and/or equipment.
- Provide guidelines, regulations, and frameworks for the integration of broadband and connectivity services in TVET institutes to ensure the impact on access and equity is considered and measures are taken to address it.
- Review inter-agency referral and outreach systems and identify digital opportunities to streamline, extend and enhance communication options for information and advice services.
- To avoid further marginalization of people with disabilities, if the decision is made to introduce digitalized training products and services, include assistive technologies in all digitalization strategies and IT procurement policies and provide awareness and operational training in using the technologies in pre-service and in-service programmes.
- Consider using technologies to put in place, expand, or strengthen RPL mechanisms, to recognize skills acquired through informal, non-formal or formal learning and to assist users to participate and complete the process.
- Make the best of data that can be retrieved in all the systems in place to make informed decisions and continuously improve content, process and the organization.
- Maximize the use of technologies to ensure the integration of career guidance and employment functionalities in the skills development lifecycle, to provide adapted counselling before training happens, and link the recently graduated learners to potential employment, traineeship or apprenticeship opportunities.
- Provide guidance to equip learners with devices they can use (even offline) to ensure the continuity of the learning experience outside of the classroom – whether it be for research and homework purposes, or self-paced learning activities.
- Provide support to teachers and learners to maximize engagement and adoption of the new learning ecosystem, pedagogical approaches and all sorts of technologies and devices they will be using.



Country examples

Digitalization to improve access to skills development and the labour market

<p>Online skills portfolio</p> <p>Sri Lanka</p> <p>Skills Passport</p>		<p>Skills Passport</p> <p>The Skills Passport is an online portfolio that records, assesses and verifies an individual's formal and nonformal skills. It is intended to help migrant and returning workers to receive recognition of their learning for employment purposes. Participants receive a card with a QR code for ease of access to their online information. The Skills Passport is a collaborative development involving the Technical and Vocational Education Commission (TVEC), the Employers Federation of Ceylon (EFC) and the ILO.</p>
<p>Online training and employment platform</p> <p>Jordan</p> <p>Mehnati</p>		<p>The first on-line job counselling and guidance platform to target Syrian and Jordanian workers launched by the ILO in Jordan. The platform offers workers improved access to job and training opportunities across multiple sectors. It is also the first of its kind to integrate web, mobile and telephone services under one platform, making the new system easily accessible to workers, reaching out to a greater number of workers. Available in Arabic and in English, the new platform facilitates the matching of workers with suitable employment and training opportunities. At the same time, it facilitates employers' access to a qualified workforce.</p>
<p>Platform for youth</p> <p>Africa</p> <p>YOMA Africa</p>		<p>Yoma Africa</p> <p>An online platform, which connects African Youth with learning, skilling and employment opportunities in a structured and sustainable way. Training providers offer courses through the platform and youth can earn points/tokens as they build their skills, gain experiences by participating in challenge calls and earn badges for their digital CV. Employers can recruit directly from the platform.</p>
<p>Recognition of prior learning</p> <p>Canada</p> <p>Recognition of Prior Learning</p>		<p>Red River College</p> <p>Recognition of Prior Learning (RPL) is a process that identifies, documents, assesses and recognises formal study, and informal and non-formal learning gained through work and life experience. Red River College evaluates and grants credit for qualifying previous learning that is equivalent to learning outcomes in college courses and programmes. RPL orientation is provided through the RRC website.</p>

<p>Assistive technologies</p> <p>South Korea</p>		<p>Korea Employment Agency for the Disabled (KEAD)</p> <p>The agency supports a number of vocational training programs, including specialized training institutes that use assistive technologies for teaching including sign language support.</p>
<p>e-learning aggregator platform</p> <p>India</p> <p>eSkill India</p>		<p>National Skill Development Corporation (NSDC)</p> <p>The aggregator consolidates B2C e-learning portals operating over the internet in the Indian skills system. These portals create and source e-learning content in a hub and spoke manner enabling multiple e-learning players, strong in specific skilling sectors, to share their strengths. Bringing a wide variety of partners and associates for e-skilling, career guidance or talent management, the system provides opportunities for individuals to choose an e-learning course from an aggregated catalogue.</p>
<p>Specialist centre for flexible non-formal delivery for informal sector</p> <p>Nigeria</p> <p>Flexible Skills Development Centre</p>		<p>The Flexible Skills Development Centre, Yaba College of Technology</p> <p>This centre liaises with the academic departments to develop and offer short, non-formal flexible courses to learners with the aim of empowering learners to earn a sustainable livelihood. Unlike the regular formal courses offered by the College, these courses have special characteristics:</p> <p><i>Flexible:</i> The mode of delivery is not rigidly face-to face. Learners can study at their own pace in their preferred location most of the time. Only the practical sessions involve elements of face-to-face learning.</p> <p><i>Supported:</i> Learners are fully supported during and after the course through the deployment of different techniques like peer-to-peer interaction by course participants using our online forum, real-time discussion/interaction with the facilitators anytime of the day etc.</p> <p><i>Market-ready:</i> All courses have a module on how to establish and run a sustainable business based on the skill acquired.</p>
<p>Flexible delivery of courses</p> <p>Ghana</p> <p>Institute of Open & Distance Learning</p>		<p>Institute of Open and Distance Learning, Koforidua Technical University</p> <p>The IODL collaborates with existing departments of the University for the integration of Flexible and Blended Learning (FaB) methods in campus-based programmes with the aim of making skills training more accessible. The introduction of flexible and blended methods is expected to boost the delivery of campus and off-campus based programmes at the university by providing access to teaching and learning in different formats, both electronic and print, to students, including the use of video, audio and audio-visual materials for off-line learning. Thus, the mandate of IODL is to provide an opportunity for workers to learn at a time, place or pace which satisfies their circumstances and requirements.</p>



Models and guides

Digitalization to improve access to skills development and the labour market

Making TVET inclusive

ILO Skills and Employability Branch

[Guide and assessment tool on the inclusiveness of TVET and skills development systems for all \(ilo.org\)](#)



The guide aims to help skills decision makers and practitioners assess to what extent their TVET system is currently excluding certain individuals or groups, identifies underlying reasons, and provides practical ideas on what could be done to redress inequalities. The guide's self-assessment tool is also available in digital format. It is designed for policy makers and workers' and employers' organizations engaged in skills development systems, TVET centre staff, and development practitioners providing skills policy advice.

Implementing ICT in TVET and skill development

Skills and the Future of Work: Strategies for inclusive growth in Asia and the Pacific

[Technology-enhanced TVET delivery for improving access, relevance and inclusion in Asia and the Pacific](#)

ILO



Chapter 9 covers ICT implementation in TVET in six countries (Australia, Hong Kong (China), New Zealand, the Philippines, the Republic of Korea and Singapore) and highlights five of the promising cases in which ICT has been used to shift the paradigm of TVET and skills development. These cases illustrate how the use of ICT contributes to TVET in:

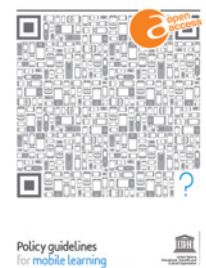
1. promoting flexible lifelong learning, especially to those who had missed out on basic education
2. enhancing learning engagement and social learning
3. providing authentic and simulated learning.

There are policy recommendations to guide TVET institutions on ICT-supported practices essential for the future of work.

Using mobile devices

[Institute of Open & Distance Learning](#)

UNESCO



Today, a growing body of evidence suggests that ubiquitous mobile devices – especially mobile phones and tablet computers – are being used by learners and educators around the world to access information, streamline administration and facilitate learning in new and innovative ways.

This set of guidelines seeks to help policymakers better understand what mobile learning is and how its unique benefits can be leveraged to advance progress towards Education for All.

Practice Guidance Note: Remote Learning & COVID-19

[World Bank Document](#)

The World Bank

The World Bank Education Global Practice
Guidance Note: Remote Learning & COVID-19 (updated April 7, 2020)

THE CHALLENGE
Before the outbreak of the novel coronavirus pandemic, the world was already dealing with a learning crisis, as evidenced by high levels of *learning poverty*. With the spread of the coronavirus disease (COVID-19), learning loss has deepened in many countries. Many countries have implemented temporary school closures, leading to a *learning crisis* and a *learning crisis*. Extended school closures may cause not only loss of learning for the students, but also hinder access to formal and non-formal learning opportunities in the long term. To help mitigate the loss of learning, many countries are pursuing options to allow remote learning to manage and cope with the crisis.
The World Bank is actively working with Ministries of Education in several countries to support their efforts in providing remote learning opportunities where schools are closed. This guidance note offers principles to maximize countries' effectiveness in designing and executing remote learning. It will continue to update as useful practical lessons emerge. Our guidance notes share the latest detail on the effective use of radio, television, and mobile technology for remote learning in low-resource environments.

To help mitigate the loss of learning during the COVID-19 pandemic, many countries are pursuing options to utilize remote learning to manage and cope with the crisis. The World Bank guidance note offers principles to maximize countries' effectiveness in designing and executing remote learning.

**Knowledge Packs with
a focus on low-resource
settings**

Education and Technology:
EdTech Publications
(worldbank.org)

The World Bank



Low-resource contexts in Least Developed Countries (LDCs) and Fragile, Conflict and Violence (FCV) affected environments lacking the necessary connectivity and devices are deploying alternative EdTech tools such as educational television, radio, mobile phones supported by print material.

**Connecting learners:
Narrowing
the educational divide**

EIU_Ericsson_Connecting.pdf
(economist.com)

The Economist – Ericsson – UNICEF



The chain of impact from school connectivity to socio-economic gains begins from improved learning outcomes for children. If improved connectivity is supplemented with the right policies to integrate technology in education, it can improve access to learning resources and enhance the quality of education. Improved learning outcomes for children, combined with enhanced digital literacy skills, allows the benefits of school connectivity to permeate through the life of an individual, from childhood to adolescence to adulthood. New doors are opened for further education and career pathways, offering better opportunities at all stages of life.



8

► 8. Develop skills for employability, decent work, and productivity (Building Block 5)

Overview

Developing “employability” in one sense is the core purpose of TVET and skills system, because it describes an effective relationship between training programmes (supply) and work placement (demand).

Measures to develop employability are the main focus of a cluster of policies, strategies, programmes and services operating both within and beyond TVET institutes which together aim to improve an individual’s chances of finding employment. The services include career guidance, career education, tutoring and vocational support in TVET. Their role can involve providing curated access to the LMI, helping to identify employment opportunities, providing career guidance and supporting self-assessment of skills and goals. The services have a key role in reaching people who are outside the formal training system, who may be working in the informal economy or be self-employed, unemployed or under-employed.

In Building Block 3 (Training and Assessment), we noted that several characteristics of TVET systems embed employability by focusing on “job ready” training outcomes, by assessing skills whenever possible in workplaces or authentic settings, and by addressing a range of the generic employability skills valued by employers within courses as well as industry-specific skill outcomes. We also noted that the educational technology market now offers a growing range of tools to assist institutes to connect with workplaces throughout the learning journey, and to establish ongoing support for job placement following the training programme.

Digital technologies have significant and growing role both in supporting employability services and providing links between the training institutes and workplaces.

Key components of digitalization to enhance employability, decent work, and productivity

8.1 Employment services

It would seem self-evident that online access to LMI and employability services and products offers significant potential benefits to service practitioners and users alike – efficient data management, currency of information, 24/7 access, personalization of information and engaging presentation. Skills systems have accordingly developed platforms and resources for:

- consolidating and displaying LMI
- identifying job and career trends
- self-assessing skills in the context of labour market opportunities
- developing individual portfolios of work experience and skills
- monitoring job vacancies
- providing self-help portals
- developing core employability skills (training modules)
- supporting digital mentoring/tutoring/counselling
- facilitating employer engagement and matching for work experience and apprenticeship/ internship programmes

as well as

- ▶ providing training modules for service practitioners in using ICT with LMI.

However, digitalization requires much more than installing tools or uploading resources, and there have been poor outcomes when the significant challenges are not addressed. The issues associated with integrating the technologies (*or ICT*) in *employability services* have been closely researched by CEDEFOP in the EU context (see models and guides, below). Successive studies and innovation projects have produced a mature range of field-tested support resources (including a handbook, a toolkit and training modules) for policy makers, service managers and practitioners.

The work has also provided a number of valuable evidence-based guidelines which can inform national systems looking to further integrate digital technologies into their employment services. Key findings include:

- ▶ **Develop a comprehensive innovation strategy**
ICT-based innovation in career guidance requires a coordinated and persistent change strategy which addresses the impact on work and communication processes, not just technology issues.
- ▶ **Involve everyone**
Engaging all stakeholders is more than a cliché: it is essential to build ownership and check all user needs and responses.
- ▶ **Promote the change**
Actively plan to raise awareness and focus on the benefits.
- ▶ **Design with and for users**
Resources succeed if they are easy to use and meet user needs.
- ▶ **Think multichannel for inclusivity**
Develop positive options (telephone, email, chat) for users at different levels or who will lack the skills or access to use digitalized services.
- ▶ **Provide practitioner support**
Studies confirm that the best combination is the tool plus a careers practitioner trained in the use of the tools with users.
- ▶ **Integrate local information**
The most valued support is interpretation of trends and data informed by regional and local data and examples.
- ▶ **Develop career management skills (CMS) in users**
Locate LMI in a learning process, aiming for progressive development of skills leading towards autonomous exploration.

From this evidence-based work over almost a decade, we believe the lessons apply to change management approaches to digitalization generally.

8.2 Connecting the workplace

An important aspect of employability outcomes supported by digital tools is the contextualization of training to the workplace.

“Workplace-based training” has come to mean a range of work-related strategies in TVET. Apprenticeships are clearly a traditional form of training linked to work. Work integrated learning can mean a number of things, but the emphasis is on providing authentic learning and assessment tasks as close as possible to the work environment. TVET providers deliver customized on-site training programmes for employers. Employers prepare and conduct their own programmes, and work with training institutions for accreditation.

Digital technologies enable better links between the training provider and the workplace in all aspects of the learning process – programme management, providing information and resources, providing learning activities, arranging assessment, and supporting learners. This can include course management and communication support systems for apprentices and interns in the workplace, or the enhanced teaching and learning systems needed for quality blended or distance delivery, including for learners who are in employment. Some TVET institutes also offer customized online or blended training direct to the employees at a client workplace.

We also noted that the educational technology market now offers a growing range of tools to assist institutes to connect with workplaces throughout the learning journey, and to establish ongoing support for job placement following the training programme. Some available tools consist of career development support platforms that may engage learners, businesses searching for interns or apprentices and tutors/careers practitioners. Such platforms can provide the possibility of elaborating learners’ portfolios that can be used to support in-course specializations, core skills development, work experience for young people and matching with vacancies/internship/apprenticeship opportunities. When appropriately supported by professional careers practitioners they enable employers to adequately signal their needs and prospecting students to evaluate their readiness and motivation to engage in the occupations they are preparing for.

8.3 Skills for employability and productivity

Many national systems have defined a set of core/generic/employability skills to highlight the importance of cognitive and socio-emotional skills alongside technical skills in education and training. These skills are not only valued by employers but are also significant life skills in daily living in the community. However, as no single framework can fully meet the diverse needs of various countries, the government, social partners and education and training providers should develop or adapt existing frameworks to suit national contexts through social dialogue.

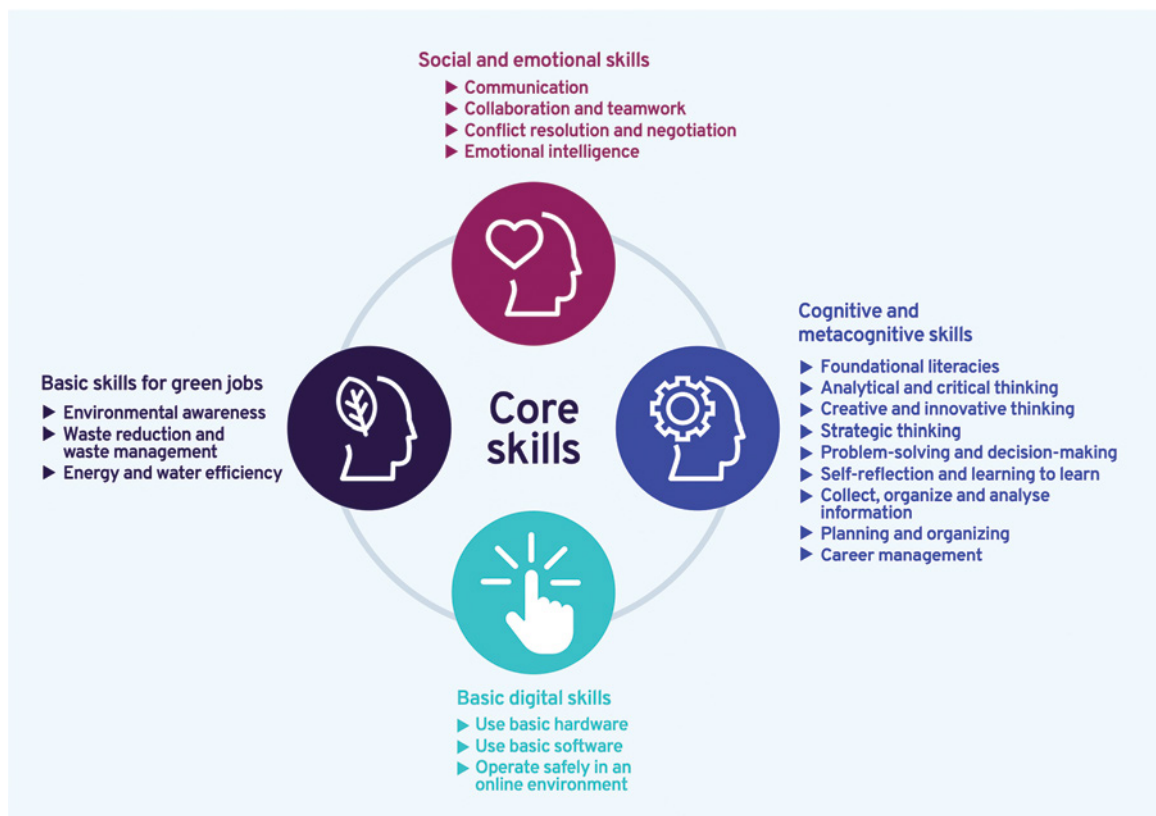
At a time of transformative change, where technologies are rapidly changing the way we live and work, basic digital skills have become part of many national and international core skills frameworks.

The ILO *Global framework on core skills for life and work in the 21st century*¹⁶ - which was published in July 2021 and reflects the ongoing transformations and emerging priorities in the world of work - not only includes a set of non-technical skills, such as social, emotional, cognitive and metacognitive, but also basic digital skills and basic skills for green jobs which are relevant to many occupations and professions. The ILO framework includes the set of basic digital skills identified by the International Telecommunications Union (ITU 2018). These are a set of skills for performing basic tasks involving the use of hardware, software and basic online operations. They enable individuals to gain digital literacy and flourish in society and at the workplace. Basic digital skills can enrich our lives, enabling us to interact with others and access government, commercial and financial services.

¹⁶ ILO Global framework on core skills for life and work in the 21st century, https://www.ilo.org/skills/pubs/WCMS_813222/lang--en/index.htm

As a result of technological innovations, new jobs are more likely to be concentrated in the non-routine and the cognitive and metacognitive categories, requiring higher-order cognitive and core skills which are less conducive to automation (Ra et al. 2019).

Also, continuous changes in the nature of work require continuous adaptation and learning, challenging a person's ability and willingness to learn but also unlearn and then re-learn (Ra et al. 2019). Work on core skills by UNICEF highlights the importance of core skills development in supporting individuals to adapt to technological change through empowering individuals to become agile, adaptive learners and active citizens (UNICEF 2019).



Source: *Global framework on core skills for life and work in the 21st century*, ILO (July 2021)

Technological changes not only drive the need for core skills such as basic digital skills, but also intermediate and advanced digital skills applicable to certain occupations and sectors where digitalization has the greatest impact¹⁷. Whereas, according to the ITU definition, intermediate digital skills encompass job-ready, generic digital skills such as desktop publishing, digital graphic design or digital marketing, Advanced digital skills are defined as skills needed by specialists in ICT professions such as computer programming and network management, and include skills such as artificial intelligence (AI), big data, coding, cybersecurity, Internet of Things (IoT) or mobile app development.

Different jobs require different levels of digital skill proficiency depending on role and responsibilities in the workplace. For instance, in order to use data more effectively to inform decision making, decision makers in HR will require beginner data management and data visualization skills in order to be able to collaborate with data specialists, whereas data scientists, analysts or engineers will require a much higher level of data management and visualization, but also other skills such as Maths, Statistics, Statistical Programming or Database creation and management.

¹⁷ Digital Skills Toolkit, ITU

<https://www.itu.int/en/ITU-D/Digital-Inclusion/Documents/ITU%20Digital%20Skills%20Toolkit.pdf>

A common approach to develop core skills in enterprises is to deliver core employability skills through off-the-shelves or customized online courses as those skills are considered cross-cutting all roles in the workplace. Multiple providers in the market also offer Intermediate and Advanced digital skills development opportunities, whether they are micro, on-the-job courses to rapidly upskill, or longer duration programs and MOOCs style courses that can last several months for broader upskilling or reskilling. Such online skills development courses enabled by digitalization have the capacity to increase lifelong learning opportunities, enabling individuals to continue upskilling and reskilling themselves, as changes happen in their jobs.

Digital tools are providing efficient and effective ways of tracking and reporting the development of employability skills in training programmes. Most skills systems and many institutes will have standalone courses or resources to develop employability skills. The skills may overlap with the “life skills” which are often a key outcome in basic education programmes in community education. These programmes are of particular importance in countries with a large informal industry sector.

8.4 Post-training strategies for employability

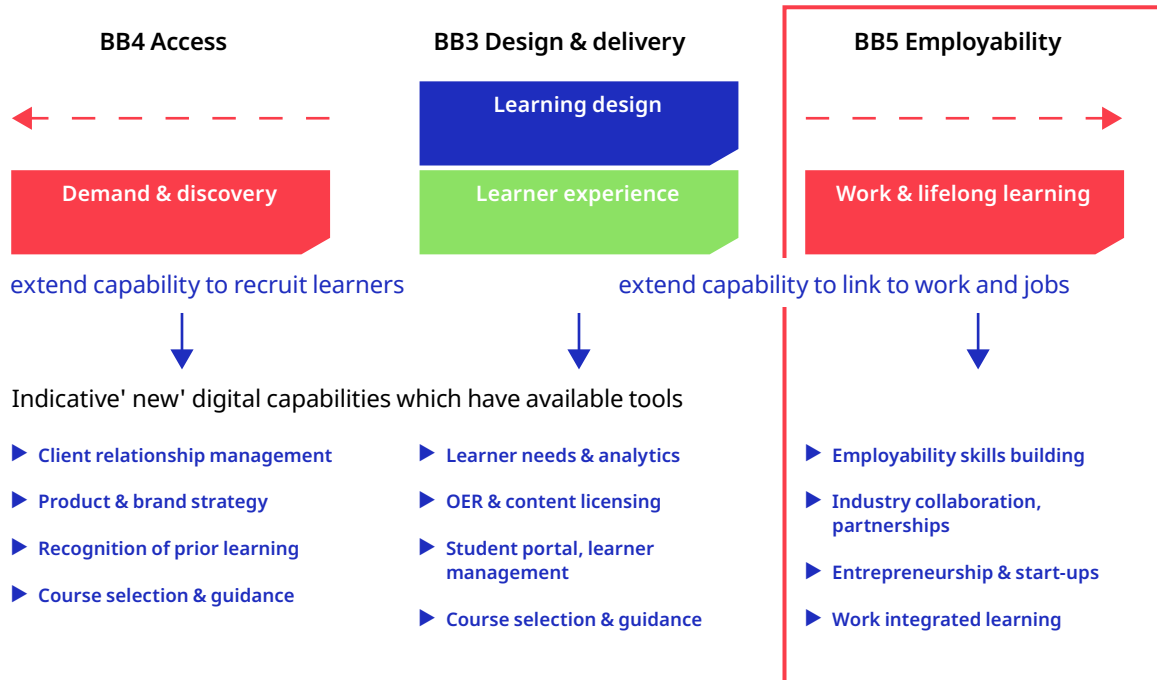
Skills mismatch and skills obsolescence can be an ongoing issue for many young people who have left training and education as well as experienced professionals who may find themselves needing to reskill or upskill. Comprehensive career guidance websites are increasingly available, providing access to multi-channelled support and information, via dynamic websites, chat, telephone, peer-forums and email. Some of these services offer partially automated support that adapt to user needs and provide tailored support. Such sites often offer the possibility of engaging in self-assessments, exploring information on training offers, developing portfolios and asking questions to online support.

There are also online courses or self-paced programmes targeting the development of employability skills available through providers such as Learndirect¹⁸. Such services deserve special attention, given the fact that they combine a digital training offer in core skills, certified technical training and access to tutoring or other types of career development support. Short skills development programmes can include time management, networking, entrepreneurship skills or self-reflexive exercises targeted at development of meta-cognitive skills that enable better career choices or self-directed learning.

We have noted that the HOLON-IQ “Digital Landscape” identifies a range of digital tools which address post-course functions related to work and lifelong learning:

¹⁸ <https://www.learndirect.com/>

FIGURE 24 DIGITAL CAPABILITIES FOR WORK AND LIFELONG LEARNING



Source: Authors, based on Holon-IQ framework (2021)

The Work and Lifelong Learning dimension includes four categories – Work integrated (or work-based) learning, Career advisory and placement, Industry engagement, and Lifelong learning. It includes a total of 21 different digital capabilities, including Skills and aptitude analysis, Industry partnerships, Resume and interview skills, Industry mentoring and Simulated work projects:

FIGURE 25 THE WORK AND LIFELONG LEARNING DIMENSION



Source: Holon IQ (2021)

These advanced digitalization trends may be more likely to be of relevance in mature national skills systems or more innovative TVET providers. However, national systems in the earlier stages of digitalization may also have an opportunity to use the HOLON-IQ framework to skip to the newer terminology, more proactive applications and extended concept of the role of training providers in the skills system and so support culture change for improving employability.

Here are some suggested ways the Holon-IQ landscape tools can be used in TVET and skills systems:

USING THE HEDC FRAMEWORK

► **Build strategies to link with the world of work**

Use the Work and Lifelong Learning capabilities in particular to help identify ways to bridge between learning and work using digital systems in TVET providers and employers. Use the digital products listing for each capability to research the processes they support, and what the tools might offer in the local context.

► **Rate institute level of digitalization – and sort priorities**

Use the built-in institute performance and impact rating from the HEDC tool to help clarify digitalization pathways and priorities for a particular TVET provider, or to survey the TVET sector. Identify the key links with other parts of the skills system which might be digitalized.

► **Inform IT procurement**

Use the listing of products under relevant capabilities to get an overview of what is available to support education managers and IT in procurement decision-making. Evaluate demonstration versions of relevant software.

8.5 The recognition and portability of online credentials

Whilst national frameworks for TVET qualifications promises to provide the job-relevant and job-ready training which employers value and job-seekers need, many non-formal programs are available that provide opportunities to develop skills and improve their employability. In part due to the COVID-19 pandemic worldwide, a huge number of online solutions are available and have been taken up, making it difficult for national TVET and skills systems to incorporate them in their qualification frameworks or recognize the qualifications they produce.

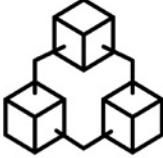


These more flexible training opportunities available outside traditional TVET pathways enable learners to develop what they need, when they need it, thus boosting their employability at any point of their career. And such skilling or upskilling opportunities, (through micro, bite-sized learning pieces, MOOCS or other types of online learning formats), should be recognized and valued along with other types of skills development curricula.

In the workplace, a vast majority of the learning life cycle happens informally, in peer-to-peer settings or project-based environments. This is more so the case now given the reduced HR budgets for learning and development as a result of the economic crisis, leading to the more efficient use of internal resources and expertise, rather than reaching out to external ones. Technologies can also help capturing such non-formal or informal skills development opportunities, thanks to platform enabling peer-to-peer knowledge transfer sessions, and rewards such as tokens or coins for having offered such service, that can then be used by their owners in exchange for other skills development opportunities with other peers and providers.

Also, as a result of increasingly tight labour markets and reduced external recruitment due to the same reasons, HR teams and managers more and more push in favour of skilling, upskilling and reskilling their workforce internally, thanks to flexible online or blended learning opportunities.

Such acquired skills should also be recognized and valued to be portable alongside the worker's journey or career path, for visibility to forthcoming employers, or clients as a freelancer. There is an increasing growth of micro-credentials that provide proof of identifiable learning outcomes associated with short courses or with non-formal learning that can contribute towards a qualification. Micro-credentials can be digital and offer badges or similar systems as proof of acquired knowledge or skills, and are increasingly used in digital portfolios. Despite their intrinsic value in increasing the visibility of the skills of individuals, many of these credentials are still not referenced with reliable certification systems, nor qualification frameworks. Reliable digital credentials hold enormous potential due to their possibility to quickly transmit information that can support matching, certification, career guidance and recognition of prior learning, especially if supported by adequate national regulation and blockchain technology (see below).

FIGURE 26 KEY DIGITAL SYSTEMS AND TOOLS TO SUPPORT RECOGNITION OF CREDENTIALS

<p>Blockchain technology</p> 	<p>Provides a single secure record of training and experience in transparent form accessible to employers and institutes for simplified verification. The emerging technology offers protection against forgery and false claims. Training institutions store credentials and certifications on a distributed global ledger, rather than centralized databases. Institutions act as the verifying authorities, ensuring that each academic credential is authenticated directly from the source. Employers can validate credentials of prospective employees without requiring third parties, or a lengthy process. Blockchain offers governments a reliable source of document verification for immigrant workers and highlights any fraudulent claims much more efficiently than currently possible. Puts trainees/employees in charge of their own credentials.</p>
<p>Management Information Systems (MIS)</p> 	<p>When integrated around an individual's pathway across different parts of the employment and training system, MIS applications can track and verify performance and achievement over time. The data can include records of learning on the job, apprenticeship outcomes, applications for RPL, and significant learning throughout and individual's worklife.</p>
<p>Information portals</p> 	<p>The development of websites to provide access to reliable key data for employers, learners and providers represent key milestones and progress indicators in the digitalization of national skills systems. Behind every portal sits the essential processes of gathering information and data, coordinating and analysing data, and selecting the most appropriate form of information display. The whole sub-system for the site depends on effective design and implementation using an appropriate digital toolset.</p>

Source: Authors (2021)

In today's labour market, multiple career paths are a reality and LLL is a growing imperative for both learners and the education and training providers looking to support them. Yet, challenges remain to ensure the quality, value, recognition and portability of many LLL opportunities, especially those provided through non-formal online learning. Digital portfolio tools are not new: mature e-portfolio applications for education have been available for over a decade, including open source options which integrate with most learning management systems. It is understood that the uptake of electronic portfolios has been mostly at institute level. However, what is new is the range of settings where they are being used in skills systems, and the significant level of systemic planning and investment they are attracting.

8.7. Implementing Digitalization to enhance employability, decent work, and productivity



Key implementation guidelines

Digitalization to enhance employability, decent work, and productivity

- Support quality career and employment service networks with open digital access to all key information, decision tools and communication options, including providing personalized dashboards to provide access to real time labour market information.
- Strengthen local tripartite collaboration between government ministries, employers and workers' organizations, as well as with the private sector, to ensure skills development opportunities (supply) match the required and needed skills (demand) in the Labour Market.
- Implement e-portfolio tools and systems to provide learner-managed portable evidence of competencies, experience and qualifications to link workplace and institute training outcomes and to empower employability service advisors.
- Develop comprehensive digital career guidance platforms with multi-channelling and associate career development support to high quality digital training platforms offering core and technical skills course.
- Ensure an appropriate regulatory base and technological framework to support the development of digital credentials that reflect granular skills and knowledge development, to support skills matching as well as ownership and portability of individual skills information.
- Review emerging digital applications which support partnership and collaboration between employers and training providers, and extend the role of providers beyond the duration of courses to include providing ongoing learning and improving employability.
- Use competency-based training and assessment to provide clear and measurable training outcomes to meet employment demand and increase job readiness of graduates and deliver performance improvement for employers.
- Provide focused development of nationally identified employability skills by contextualizing those skills to the jobs and industry within courses, as well as providing stand-alone short courses and resources in a variety of appropriate formats.
- Make sure to take a user-centric approach to online or hybrid career guidance tools, and support individuals with the use and uptake of such online counselling services.



Country examples

Digitalization to enhance employability, decent work, and productivity

<p>National Career Advice Portal</p> <p>South Africa</p>		<p>National Career Advice Portal is an online self-help tool designed to facilitate informed career and study decisions. NCAP is provided by Career Development Services in the Department of Higher Education and Training. It provides information to job-seekers on career options, job services, and also self-assessment tools for career-paths and skills. It also provides information on green careers and those in high demand as well as trades.</p>
<p>National apprenticeship portal</p> <p>Digital Apprenticeship System</p> <p>United Kingdom</p>		<p>The Digital Apprenticeship service is a government portal for employers, training providers and trainees searching for apprenticeships. For employers, it provides access to apprenticeship levy funds; helps find and manage training providers; and helps manages apprentice recruitment. Trainees can find information on apprenticeship programs and also search for current vacancies.</p>
<p>Profiling job-seekers and matching vacancies</p> <p>Hire Me</p> <p>Brazil</p>		<p>Hire Me is a tool from SENAI, in partnership with Speck, an Artificial Intelligence company focused on education and work, which promotes the perfect match between those who want to work in the industry and the ideal place for that person, not only because of their curriculum, but also for their technical and socio-emotional skills.</p>
<p>National Career Service Portal</p> <p>India</p>		<p>Government digital portal provides a wide range of career related services including job search, job matching, rich career content, career counselling, information on Job Fairs, services of local service providers like drivers, plumbers, etc. for households and various other services. This portal facilitates registration of Job Seekers, Employers, Skill Providers, Career Counsellors, Local Service Providers (LSP's), Career Centres, Placement Organizations, Households (for availing the services of the LSP's) and Government Departments.</p>
<p>Matching employers and training providers</p> <p>Field Ready</p> <p>Ghana, Mozambique, Nigeria</p>		<p>Digital employability portal for the oil and gas industry. This private sector company links national training institutions to employers. Linked to accredited training programmes in TVET institutions with a team of Technical Commissioners who assure that candidates are "field ready", the programme provides advice and webinars to help jobseekers get a job, build their CV and get connected to member companies.</p>



Models and guides

Digitalization to enhance employability, decent work, and productivity

<p>Online tools for labour market information</p> <p>A Case Study of Cedefop's Skills Panorama Platform and Guidance Resources</p> <p>Cedefop</p>		<p>This article explores how labour market information can be made critical to individuals, through the correct setup of careers services and integrated design of online tools. The support to the development of careers services provided by EU-based and funded online platform Skills Panorama and Cedefop's resources for guidance is explained.</p>
<p>Innovating career guidance</p> <p>International Trends and Innovation in Career Guidance: Volume 1. Thematic Chapters.</p> <p>European Training Foundation</p>		<p>A collection of innovative or promising examples of how career guidance is changing around the world. Aims to increase awareness and understanding of policy and practice in career guidance, taking into account the role digital technology will have in the future of education and career guidance.</p>
<p>National career development support systems</p> <p>Developing national career development support systems</p> <p>ILO and European Training Foundation (ETF)</p>		<p>This joint report by the ILO and the European Training Foundation (ETF) discusses how career development support systems can be developed. Departing from previous research and policy work, this publication synthesizes lessons learnt and proposes a methodology to perform national system reviews encompassing career guidance, career education and career development support to workers. The presented approach relies on assessment of key reference points, with strong contextual analysis, avoiding universal solutions for existing challenges. National stakeholder engagement is recommended to develop effective reviews and work towards a shared vision, priorities and planning for system development.</p>
<p>Using ICT and LMI in career guidance and counselling</p> <p>Policy recommendations for ICT based practices</p> <p>CEDEFOP</p>		<p>Conclusions from a study that aims to promote knowledge building and exchange on ICT and LMI usage between managers and practitioners in the field of career guidance and counselling across Europe.</p>

Pushing the Frontiers with Artificial Intelligence, Blockchain and Robots

OECD Digital Education Outlook 2021

OECD

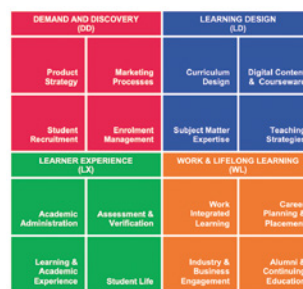


This book focuses on how smart technologies based on artificial intelligence (AI), learning analytics, robotics, and others currently change education in the classroom and the management of educational organizations and systems. The book delves into beneficial uses of smart technologies such as learning personalization, supporting students with special learning needs, and blockchain diploma credentialing. It also considers challenges and areas for further research. The findings offer pathways for teachers, policy makers, and educational institutions to digitalize education while optimizing equity and inclusivity.

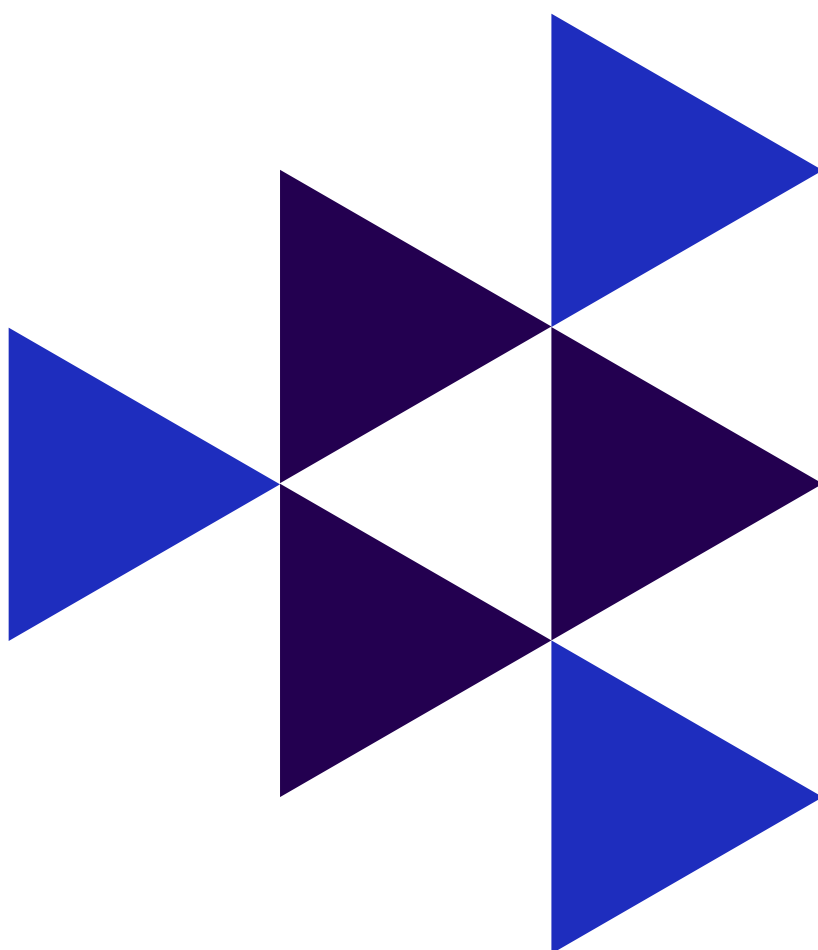
Identifying digital applications for education

Digital Capability Framework

HOLON-IQ



An open source 16-point framework identifying key capabilities underpinning digital higher education. Institutional capabilities have been mapped to four connected dimensions, from Demand & Discovery (DD) to Learning Design (LD), Learner Experience (LX) and Work & Lifelong Learning (WL). The framework encompasses current capabilities such as recruitment, curriculum design, assessment and career planning, but also looks ahead to future and emerging capabilities for successful digital learning.





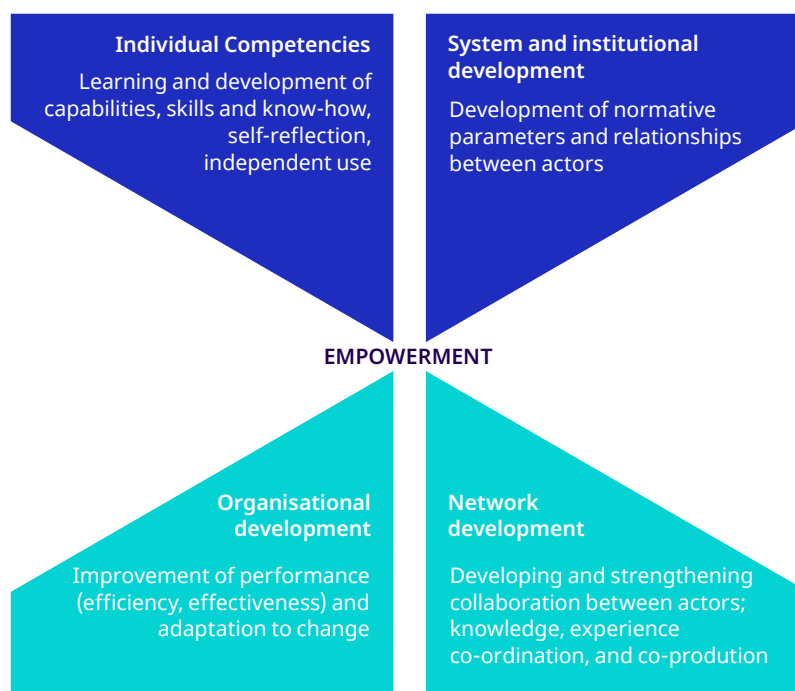
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► 9. The capability challenge for TVET and skills systems

Overview

We have touched on aspects of building capability for digitalization in various parts of the report. And although training and change management for individuals is part of the equation, we also highlighted that genuine and sustainable empowerment in the digital transition can be achieved through holistic capacity development, not only strengthening capacities on the individual, but also on the organizational, system and network levels, as visualized in the capacity development butterfly below (figure 27). And that such capacity development activities (including infrastructure, equipment, skills development and attitudes) need to take into account local dynamics and specificities, so to allow further inclusion of the most vulnerable groups.

FIGURE 27 GENUINE AND SUSTAINABLE EMPOWERMENT THROUGH HOLISTIC CAPACITY DEVELOPMENT



Source: <https://www.diplomacy.edu/> (2019)

As well as the core digital literacy associated with the increased use of computers in most work roles, the progressive digitalization of TVET and skills systems changes many work processes, which generates the need for new skills and attitudes. We have suggested that the necessary change to supporting online learning, in particular, is disruptive of work processes and changes teaching and training from a generalist individual function to a team role, requiring more specialization in education structures. Managing the change and building the capability is a complex challenge.

There are comprehensive models available describing the skills requirements and providing tools to assess organizational or individual gaps. There are fewer practical guides on how to go about building the capabilities or identifying what works. Although the pandemic has exposed the gaps in systems and demanded rapid solutions, it is too early yet to be able to collate the lessons learnt.

More evidence-based accounts of what works in workforce development in education are needed. We have drawn together here some guidelines from practice and developments in the field.

Some guidelines on capability development for digitalization

9.1 Design programmes for uptake

Competency-based approaches to training and assessment place high importance on the capability of learners to apply learning in an authentic work context during and following the training programme, but they are not characteristically applied to professional development practices in TVET, where many courses are still knowledge-based, designed for the individual participant, and not linked to uptake.

In most corporate training, it is assumed that completing formal training courses is a relatively small part of building capability. A widely-used approach in learning and development practice in organizations is the **70:20:10 model**, where structured, formal training (courses) is the 10, or 10% of the skills development effort, whereas 20 refers to Learning with and from others (peer learning, coaching, mentoring, project-based knowledge transfer communities of practice, blogs, etc.) and 70 refers to Learning from Experience (through project assignments, shadowing, action learning and problem solving, changing roles, etc.).

The Commonwealth of Learning has developed an evaluation checklist to review their suite of online courses which aim at helping TVET managers and teachers to implement technology-enabled learning to increase access (through affordability and flexibility) and improve quality and relevance in TVET provision. A workplace training model is being applied, aimed at producing measurable improvement in TVET organizations.

FIGURE 28 COURSE EVALUATION TOOL, COMMONWEALTH OF LEARNING (EXTRACT)

TVET relevance	Learning design features			Workplace uptake & impact features	
	Applied learning	Performance-based learning	Active learning	Contextualised	Supported
<input type="checkbox"/> Provides TVET specific content <input type="checkbox"/> Indicates the appropriate development level or stage <input type="checkbox"/> Uses TVET terminology <input type="checkbox"/> Uses concrete examples (stories, case studies) <input type="checkbox"/> Uses real or typical TVET documents <input type="checkbox"/> Uses minimum appropriate language level for the purpose (Plain English, readability) <input type="checkbox"/> Uses supporting graphics to present concepts (diagrams, checklists, flowcharts) <input type="checkbox"/> Uses supporting video to show processes and people	<input type="checkbox"/> Addresses identified work tasks and organisation processes in TVET <input type="checkbox"/> Produces work-ready action documents as outputs (e.g. plans and guides) <input type="checkbox"/> Indicates a sequence and timing for application of new skills in TVET workplaces following the training <input type="checkbox"/> Provides minimum necessary curated theory, as relevant to achieving outcomes <input type="checkbox"/> Provides scaffolding for the outputs (templates for reporting and action)	<input type="checkbox"/> Outcomes are stated as work competencies with action verbs (e.g. 'Implement a learning management system') <input type="checkbox"/> Assessment is based on evidence (documented or demonstrated performance) <input type="checkbox"/> Skills are contextualised to work groups and organisational processes and settings where possible <input type="checkbox"/> Required/desired quality of performance (standard) for assessment is explicitly described <input type="checkbox"/> Assessment is based on authentic workplace tasks <input type="checkbox"/> Outcomes are referenced to any relevant external standards	<input type="checkbox"/> Uses logically sequenced skill development to build up to the outcomes <input type="checkbox"/> Provides a variety of learning activities to practise all component skills for an outcome <input type="checkbox"/> Uses spaced practice to build task competence progressively <input type="checkbox"/> Typically uses a vocationally-focused what, why, how to explanatory structure for learning segments	<input type="checkbox"/> Outlines key implementation goals <input type="checkbox"/> Maps outcomes to organisational goals and contexts <input type="checkbox"/> Indicates relevant TVET staff roles <input type="checkbox"/> Addresses uptake settings, including teams and projects as appropriate	<input type="checkbox"/> Addresses manager engagement <input type="checkbox"/> Addresses colleague/team engagement <input type="checkbox"/> Addresses post-course uptake actions and options (to support transfer of learning) <input type="checkbox"/> Includes strategies for for medium term impact evaluation <input type="checkbox"/> Provides selected guide for further on-job reading, resources and tools

Source: COL. Used with permission (2021)

9.2 Describe the changed tasks and clarify roles

Following TVET and enterprise training practice, the first challenge in designing effective training is to clarify the work processes involved and who does what. Here is an example of a role and tasks analysis completed at a large post-secondary provider expanding its offering of online (distance) courses, in this case using Moodle:

FIGURE 29 CHANGING ROLES FOR TEACHERS IN ONLINE LEARNING (EXTRACT)



Course writer?



Media producer?



Learning designer?



Online facilitator?

Teaching online
What's my role when we take our courses online?



Developer?

Source: LearnWorks (planning workshop materials) (2021)

FIGURE 30 PROCESS DESCRIPTION AND TASK ANALYSIS FOR ONLINE COURSE DELIVERY

teaching and learning	before delivery			during delivery	after delivery
	A Preparing content subject expert	B Designing learning sequence (offline) learning designer	C Authoring Moodle unit (online) author	E Facilitating online unit unit facilitator	G Reviewing unit evaluator
	<ul style="list-style-type: none"> decide topic sequence and grouping research and select content sources collect content and links (readings, videos, graphics) write unit and topic learning outcomes outline assessment tasks 	<ul style="list-style-type: none"> clarify learner cohort(s) prepare assessment task content (quizzes, assignments, exams) decide learning style and sequence(s) for topics design learning activities (group, individual) write linking introductions (unit, topics) list development needs (media, graphics, SCORM) prepare study plan (summary for learners) 	<ul style="list-style-type: none"> set up unit template select home page blocks add profile, introduction and overview add unit assessment overview and requirements set up topics (Book) add topic outcomes load topic content/links build assessment tasks with feedback build learning activities, with interactions (various extensions) write linking introductions load/build study plan test navigation, feedback, media & links 	<ul style="list-style-type: none"> monitor early activities for new online learners respond to learner problems (assist, or refer) provide timely individual feedback (email, forums, phone) provide learning support (queries, issues, clarifications) maintain and refresh site (update calendar, news) record/upload lectures and support materials drive forum participation (active moderation) prepare and present Connect workshops monitor and trouble-shoot engagement levels 	<ul style="list-style-type: none"> review retention and completion levels, any causes review and assess learner/client satisfaction feedback identify weaknesses in unit design, course site, support or facilitation modify design and Moodle site as needed identify further enhancements
specialist services					
	D Developing media developer	F Supporting learners supporter	H Engaging graduates marketer?		
	<ul style="list-style-type: none"> source/prepare photos source/prepare graphics record audio record/edit video record lectures develop tutorials (SCORM) and animations 	<ul style="list-style-type: none"> provide technical support (help desk) provide administrative support (enrolment, registrations, finance) provide learning support (library, study skills) 	<ul style="list-style-type: none"> initiate post-course/unit contact and follow-up (pathways) manage ongoing access to online resources source case studies and testimonials 		

Source: LearnWorks (2021)

In this initiative, teachers were able to nominate which of the roles they wished to perform in the design and delivery process for their courses, depending on their skills, experience and contractual understandings. The analysis was then used to restructure and expand the provider's learning design specialists to operate as internal consultants, provide an "opt-in" process for teachers to select the level of specialist support they wanted, and provide individualized professional development programmes.

9.3 Develop capability for all roles, not just teaching/training

Capability development for staff in vocational education and training is often focused on the teaching function. Digitalization requires capable management of the change process, so focussed leadership development and support programmes for managers and senior administrators are essential. Providing change management support and necessary training ensures adoption from the management teams and provides more guarantee that they will support implementation further on.

Here is an extract of a sample checklist to identify a training provider's strategic and management capabilities for e-learning (online and blended learning) at organizational level:

FIGURE 31 E-CAPABILITY CHECKLIST (EXTRACT)

The E-capability Checklist

A capability is simply what your organisation can do now.

It requires skills, but also the robust technical systems, clever work processes, accepted resource allocation agreements, efficient communication systems and clear outsourcing arrangements.

Current level

Rate your organisation's current level of e-capability (tick one number)

Strategic
capability

Management
capability

Design & delivery
capability

Learning materials
development
capability

The four capability areas for e-learning

Strategic e-capabilities	1=very poor, 2=poor, 3=average, 4=good, 5=excellent				
Interpreting trends in using web-based technologies for training	1	2	3	4	5
Analysing business opportunities and threats from the technology trends	1	2	3	4	5
Monitoring e-learning development in competitors	1	2	3	4	5
Identifying types of e-learning relevant to the training business	1	2	3	4	5
Articulating the role of e-learning in the business	1	2	3	4	5
Developing an e-learning strategy	1	2	3	4	5
Establishing clear leadership goals and targets	1	2	3	4	5
Identifying, developing and supporting e-learning leaders	1	2	3	4	5
Marketing, supporting, monitoring and updating the strategy	1	2	3	4	5
Recruiting or developing appropriate e-skills for the business	1	2	3	4	5
Evaluating, selecting and implementing e-learning systems and services	1	2	3	4	5
Integrating e-learning needs in web and intranet services	1	2	3	4	5
Designing and implementing e-learning embedding strategies	1	2	3	4	5
Total strategic score/percentage	/65		or		%

Management e-capabilities	1=very poor, 2=poor, 3=average, 4=good, 5=excellent				
Identifying opportunities for e-learning initiatives	1	2	3	4	5
Making a business case for using an e-learning solution	1	2	3	4	5
Selecting and resourcing leaders to drive e-learning	1	2	3	4	5
Forming and resourcing e-learning project teams	1	2	3	4	5
Providing and administering useable and reliable e-learning tools and systems	1	2	3	4	5
Managing e-learning projects, on time and on budget	1	2	3	4	5
Establishing flexible staffing to support e-learning	1	2	3	4	5
Establishing team workflow processes for e-learning initiatives	1	2	3	4	5
Contracting and managing e-learning specialists for skill gaps	1	2	3	4	5
Managing e-learning content development staffing and processes	1	2	3	4	5
Providing e-learning consultancy services to business or internal clients	1	2	3	4	5
Managing contracted e-learning content development	1	2	3	4	5
Marketing e-learning internally, including to client employees	1	2	3	4	5
Promoting e-capability externally	1	2	3	4	5
Evaluating the impact and value of e-learning initiatives	1	2	3	4	5
Total management score/percentage	/75		or		%

Source: LearnWorks (2021)

9.4 Use new workplace learning technology

In Building Block 3 (Training and Assessment), we suggested that skills systems and TVET providers could use blended learning management systems such as Moodle Workplace and Totara to manage and deliver more of their staff training. Self-paced learning at the desk is used widely in IT training (computer applications, including office suites and the Internet) and Systems Training (using new administrative systems, including LMSs), both significant components of capability development for digitalization. The use of technologies also makes it possible to support non-formal and informal learning in the workplace, and integrate it more efficiently (on-the-job) in the daily work and tasks of employees, trainees or apprentices, thus enabling on-time skills development to happen.

9.5 Use projects for capability development

Perhaps because delivering courses is their specialty, TVET providers may also see courses for individual staff members as the main strategy for developing new capabilities – but they are not the only solution, and may not be the most effective approach to workforce development in institutes.

For example, using a basic project structure (an action plan, a manager, a team and schedule) to prepare a new programme for online delivery offers several advantages over courses-based training or workshop-style professional development. A project team requires the relevant staff (IT, trainers, teaching department, enrolments, etc.) to work together in context, understand each other's role to “use the skills in the group”, and solve problems. It is contextual “learning by doing”. It is likely that much of the response to the pandemic was characterized by project and task-based learning for teachers, because there was insufficient time to plan and deliver structured programmes.

A nationally funded programme in Australia (E-Learning Innovations, Australian Flexible Learning Framework) provided funds to project teams in providers (mostly TVET) to prepare new accredited online courses for market. Some projects were for business-provider partnerships to deliver training to employees, while some were for public programmes for enrolled students. The teams could allocate funds for any necessary professional development, but it was not a requirement. A longitudinal evaluation in 2009¹⁹ showed that one third of the 2008 projects achieved their key target outcome (viable number of participants enrolled in first offering of the course). Over 80% of project team members were engaged in further online innovation in the following year. Few teams chose to attend courses to build skills – they learned on the job, using a range of methods and resources to develop their capability within the time and budget constraints.



Country examples

Capability building for digitalization

Building a teacher's digital skills using blended learning

Essential Digital Skills Programme



Adults with no or low digital skills can take Essential Digital Skills (EDS) qualifications free of charge from this portal. This continuing professional development programme is designed to support teachers and trainers and those who want to develop their own digital skills. A blended training programme consisting of five elements: an interactive self-assessment tool to identify training needs; online resources, including a series of 20 short online learning modules with teaching exemplars and advice on teaching contexts, as well as digital badges to recognize achievement; face-to-face training and online webinars to build confidence and share practice related to different teaching contexts; online communities of practice for different further education pathways to offer tailored peer-to-peer support; and a multimedia CPD toolkit as a guide through the programme.

Building employability skills for IT professionals by distance learning

Brasil Mais Digital

Brazil

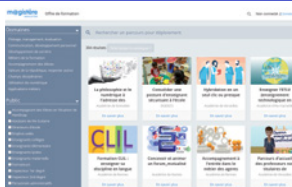


A distance education portal that works on three essential points of professional training: knowledge, training and opportunities. It offers 35 different courses that provide an introduction to Information Technology, programming and other topics. Each course lasts an average of 20 hours. The target audience is young people and adults looking for an opportunity in the job market, and also those who still do not know which career to pursue.

Providing continuous online training for teachers in using technology

M@gistère

France



A platform provided by the Ministry of Education, Youth and Sports to provide an online continuous training system for teachers. Include digital skills, software programs and teaching approaches that integrate technology in classroom delivery.

¹⁹ The Australian Flexible Learning Framework was defunded in 2014. The unpublished evaluation report is available from the authors.

Training TVET teachers in using blended learning

Blended Learning Essentials for Vocational Education & Training

Global

Future Learn



Learn how to promote effective practice and pedagogy in blended learning on this vocational education training course designed specifically for TVET trainers.

Offered by the Institute of Education and University of Leeds.



Models and guides

Capability building for digitalization

Identifying digital competencies for teachers

DigCompEdu

Digital Competences for Education

European Commission

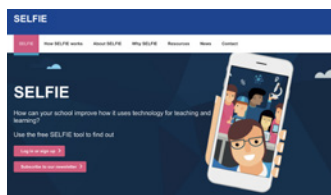


The European Framework for the Digital Competence of Educators (DigCompEdu) is a scientifically sound framework describing what it means for educators to be digitally competent. It provides a general reference frame to support the development of educator-specific digital competences.

Embedding digital technologies in educational institutions

SELFIE

European Commission

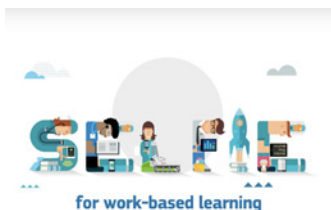


SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies) is a free tool designed to help educational institutions embed digital technologies into teaching, learning and assessment. SELFIE has a strong basis in research and was developed based on the European Commission framework on promoting digital-age learning in educational organizations

Embedding digital technologies in training and apprenticeship programmes

SELFIE for Work-based Learning

European Commission



Adapted SELFIE tool to include a module of work-based learning which adds the views of in-company trainers. The aim is to improve coordination between TVET institutions and training companies and discuss how they could jointly embed digital technology in their training and apprenticeship programmes.

Piloted in Germany, France, Poland, Hungary, Montenegro, Serbia and Turkey.

Developing and implementing online courses


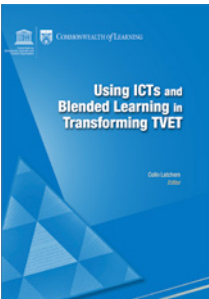
Online Learning Toolkit

MIT

USA



The Online Course Design Guide was produced by the Massachusetts Institute of Technology Office of Educational Innovation and Technology (MIT-OEIT), to support instructional designers, educators, and facilitators in the development and implementation of online courses. Each section of the guide contains critical information, recommendations, examples, checklists and resources for further exploration to create and deliver effective online learning experiences.

<p>ICT for learning – processes and tools</p> <p>Digital Learning Toolkit</p> <p>UNICEF</p> <p>Aga Khan Foundation</p>		<p>The ICT for Learning Process and Tools toolkit is designed to enable national governments, and schools to maximise the return on investment in ICT. The toolkit guides users in ICT planning and investments by identifying the realities of the education system and schools in their own context, develop context-relevant solutions to prototype, learn from the prototype and develop “ICT Actions for Change”.</p> <p>Volume I provides tools for schools and education providers while Volume II provides tools for sub-national and national governments.</p>
<p>Showcasing ICT and blended learning in TVET</p> <p>Blended Learning for TVET</p> <p>UNESCO/Commonwealth of Learning</p>		<p>This book brings together the work of several leading experts, presented as a series of case studies from around the world showcasing the use of ICT and novel forms of open, flexible and technology-enhanced learning in TVET.</p> <p>Case studies from Australia, Cambodia, Canada, Jamaica, New Zealand, Germany, Finland, Sri Lanka and the INVEST Africa programme in 8 African countries (Kenya, Uganda, Zambia, Tanzania, Mozambique, Nigeria, Ghana and The Gambia).</p>



10

► 10. Implementation guidance

Digitalizing national TVET and skills systems to support LLL

Key messages

In our review of digitalization in national TVET and skills systems around the world and relevant models and guides, it clearly appeared that there is not one single framework or standard approach to undertake such digital transition within each building block we have used to describe national TVET and skills systems. However, some key messages have emerged.

Social Inclusion as a condition in any digital transition strategy

For each of the building blocks, it is necessary to consider the local capacity building and development of all stakeholders and actors, to make sure technologies are used to serve individuals' needs, according to their own capacity (mainly infrastructure, equipment, skills and attitude) to use them.

We saw that a user-centric approach combined with design thinking has the capacity to improve inclusive approaches to skills development and access to the labour market, thus avoiding excluding further already disadvantaged and vulnerable groups, only leveraging technology whenever it has value to enhance all or part of their experience.

Responsiveness to the labour market needs resulting from digitalization

As one component of a broader LMIS, skills needs anticipation, aims to provide information to all labour market actors about potential future skills needs and imbalances, so that they can make decisions, develop measures and take actions with a view to meeting the needs and avoiding the imbalances.

Technologies and digitalization have the capacity to support anticipation of future skills needs to avoid skills mismatch, strengthen training and skills development systems, and increase their responsiveness to the labour market needs resulting from digitalization.

Digitalization has a pivotal role in national responses to COVID

The key functions of national skills systems have been severely impacted by the pandemic. Many governments have been impelled to intervene quickly and decisively in the labour market in previously unthinkable ways, leaving an uncertain pathway and timeline to recovery. Remote teaching has been an emergency response widely considered to be unsatisfactory and unsustainable. The more virtual world which is emerging will be heavily reliant on purposeful planning for the digital transformation of processes and organizations.

This report has identified digitalization initiatives in many countries, including innovative solutions across the full range of activities in a skills system (the five "building blocks" in the framework). However, it has also become clear from the country examples that the extent and impact of digitalization in national TVET and skills systems varies widely. The "next steps" to take are a system-by-system challenge. However, what has changed for all countries is that the time for those next steps is suddenly now.

National skills systems need to become whole systems

Some national skills systems have developed mature models to manage the overall function of describing and monitoring national skill requirements and managing skills supply through training providers. Many have parts of the whole but appear to lack the necessary legislative agreements between the ministry of labour and the ministry of education, or key coordinating bodies or effective connections and information flow. Some will have TVET and labour market functions operating almost independently of each other.

The ILO “building block” model used as a base for this report suggests the compelling need for the components of the national skills system to be viewed as a whole. The relative complexity of the structures and the wide range of stakeholders in many national skills systems can reduce the visibility of the whole, disguise the critical importance of links and relationships, and exacerbate the tendency in human systems to develop “silos”.

It is hoped that the building blocks approach and summary diagram, together with the models, guides and country examples relevant to different stages of digitalization can be used to refresh discussion and inform professional dialogue about the national TVET and skills system as a whole and how the application of digital technologies can increase quality and relevance without negatively affecting access and equitable outcomes.

Digitalization of TVET requires TVET digital solutions

This framework highlights some excellent examples of where skills systems and TVET institutions are moving towards digitalization although a good number of the country examples or models and guides have been drawn from general or higher education.

There are, of course, issues related to digitalization which TVET will share with schools and universities, and these have been drawn on where appropriate in this report. However, relatively few studies and models are contextualized directly to the TVET role in post-secondary education and training. In particular, they lack sufficient focus on the defining features of the TVET sector such as applied learning for job readiness, national curriculum and quality standards regulation, close links (including partnerships) with employers and industry bodies, distinctive training and assessment models notably (but not only) for trades and practical skills, the fundamental importance of workplace-based learning (in its several modes), very different teacher pre-service training requirements and arrangements, important links to employer training and workforce development and, of necessity, very different approaches to online learning. This list expands even further when we add the interdependence of TVET providers with the labour market infrastructure which may include industry skills bodies, qualifications authorities and provider regulators, and include the role of institute-based careers guidance officers.

Some of these gaps have been addressed in the commentary on the components of the skills system, but this sharper focus on TVET practices is seen as an important need in consequent and future studies.

Digitalization is about change management

Although stages in digitalization may be signalled by the installation of a platform or application, the essential impact is on work processes, which are always changed, often disrupted. Changes in process require redesigning work roles, which changes skill requirements. Ideally, the discussion about process redesign (and expected improvements and benefits) will have taken place before or during the IT procurement stage, so there is a roll-out plan. Change management also requires the involvement of key stakeholders in the choice of solutions and in defining implementation processes.

This is not only true for IT teams who necessarily need to be involved at the earliest stages, but also true for all types of stakeholders and actors of the new ecosystem, who need to be part of the solution definition and implementation process using design thinking, to make sure a human/user-centred approach is taken, and that adoption is eventually maximized.

Many of the country examples reviewed show organizations dealing with the complexity of these changes. The digital tools can offer (and deliver) great potential benefits, but training in “using the tools” is usually a relatively minor part of the making it work. It’s about learning to work differently, which is not a course. Leaders in this environment will understand work process design and change management strategies.

In the discussion of employability we have highlighted an ILO change initiative which describes some evidence-based guidelines for implementing change effectively. The change management approaches in many of the digital initiatives reviewed were not always articulated, although implicit. It would be useful to revisit projects to provide some analysis of what was tried and if possible identify the elusive “what works” (and what doesn't) in change management for digitalizing training processes and programmes.

Building digitalization capability requires a workforce development approach

If learning new processes as well as “operating the tools” are both included, the task of building digital capabilities, especially in TVET institutes, is formidable.

It is becoming unhelpful to dwell on the shock impact of the early stages of the mandatory uptake of remote teaching in many countries. It is perhaps too early yet to identify patterns in the response of education systems generally. It is not yet possible to discern any articulated overall strategy or approach to capability building for digitalization in TVET.

Throughout the report it has been suggested that capability building for digitalization in TVET might be better modelled on workforce development approaches used in industry rather than on the “short courses for teachers” which characterises much professional development practice in education and training. This might include workplace learning features such as describing the (new) processes and tasks required, describing the competencies for the changed roles, and providing a customized programme of development. It might include using the digital technology developed to support this approach (a workforce or hybrid LMS, such as Totara). It might integrate competency-based assessment to provide a form of accreditation or recognition for achieving levels of digital capability.

Summary of guidelines for national TVET and skills systems

Whilst each section of the report dealing with the different building blocks included a set of implementation guidelines, they are reproduced here in full to provide an overall summary.

While they are addressed primarily to national skills system leaders, planners and managers, most of the guidelines can also inform complementary innovation strategies at regional, provincial or organization/institute levels.

Digitalizing skills system governance

- ▶ Envision digitalization as a way to *rethink* thoroughly national TVET and skills systems using innovative approaches, not simply adding technology to existing organizations, processes or curricula.
- ▶ Prepare to move from short-term *emergency* responses to longer-term strategic approaches to digitalization, digitization and digital transformation, adapted to your own local needs.
- ▶ Provide a fresh vision, with proactive leadership and targeted change initiatives.
- ▶ Push for the implementation of policies on infrastructure, connectivity and equipment, to make sure digitalization of national TVET and skills system is inclusive, and does not increase the digital divide.
- ▶ Promote and foster cross-ministries joint work to enable efficient linkages between all parts of the TVET and skills system.
- ▶ Foster communication and anticipate change among teams and individuals, involving all stakeholders to prepare them to the new ecosystem's changing roles and responsibilities.
- ▶ Review current communication and collaboration systems and practices to implement systematic digitalization of effective virtual work processes across the skills system.
- ▶ Develop or upgrade national IT platforms and interoperability standards to support new digital applications and promote secure access.
- ▶ Include IT teams in the earliest stages of the digital transition to anticipate all the linkages, and to keep them as *allies* all through the process of implementing, maintaining and upgrading relevant technical solutions.
- ▶ Adopt a user-centric, demand-oriented approach, using techniques such as design thinking to make sure all actors are involved, and thus maximizing inclusion as well as adoption.
- ▶ Promote and push for the creation of national online communities to increase sharing of best practices and online learning and teaching solutions.
- ▶ Consider implementing national curation, development and distribution of core exemplar digital learning materials, by industry, and developing or extending an ongoing specialist national function, to maximize investment, efficiency and quality for a more sustainable approach.

- Include teachers' and trainers' awareness, training actions and capacity building at the policy level, to make sure educational staff is well aware of the possibilities brought by technology, and prepared to operate in this new ecosystem, including tackling with learners having a hard time adopting it.
- Include basic digital skills development and opportunities to learn how to learn online at the policy level to ensure lifelong learning is made possible.

Using technologies for stronger labour market skills needs anticipation

- Benchmark relevant national labour market analysis systems to identify digitalization options which can improve efficiency and effectiveness.
- Review the national LMI network and system for gathering, analysing, and publishing LMI to identify gaps or weaknesses and new digital solutions available to improve performance.
- Improve collaboration between ministries and national agencies in charge of LMI, Education, and Employment, due to the interdependency of collected and utilized data.
- Establish Research and Development teams and/or expert profiles in frontier technologies within Ministries of Labour, Employment and Education to ensure a dynamic and integrated approach to labour market planning is taken, and that new technologies applied to LMI are being anticipated, piloted, and implemented according to the local needs and organizations.
- Review the national processes for aligning skills supply and demand, and (where relevant) consider the business case for implementing national skills standards to deliver training outcomes which more reliably meet identified demand.
- Ensure dynamic evolution of TVET skills development curricula, working on establishing dynamic and closer links with the industry/sectors to inform in-demand skills and training offers design and delivery, thus maximizing employability and learning outcomes.
- Adopt a user-centric approach to designing client-facing solutions that use data visualization tools to provide relevant data aligned with end-users needs.
- Make sure to include end-users in the design stages, and anticipate communication and training for all staff members, to ensure efficient uptake and adoption of the new tools and processes.

Digitalizing skills development, certification, and recognition

- While implementing or consolidating digitalization of learning management for course delivery, TVET institutions should consider new digital options to support the whole learner experience, including: pre and post course functions such as learner engagement, partnerships with employers, uptake of skills in the workplace, and improving graduate employability.
- Inform training offers digitalization priority setting consulting closely with LMI, employers' organizations and the private sector, to ensure transformation is demand-driven, according to specific requirements of the local labour market.
- Refer to national strategies (such as Digital or Green), as well as to Sector Skills Councils (or equivalent) to inform decision-making on priorities. This will also enable finding more support when it comes to implementation.

- ▶ Invest in long-term solutions, and not quick-wins, proceeding with a thorough needs analysis, and including IT teams in the early design of online solutions to make sure they support the choice of efficient and inclusive solutions, but also support implementation and agile evolution of such solutions.
- ▶ Define upstream the KPIs you need to be measuring and comparing in a data-driven approach (using learning analytics), to make sure you then opt for tech-enabled solutions that allows for such measurement, analysis, and comparison among systems and solutions.
- ▶ Review current or legacy approaches for assessing practical skills and re-design them as online-friendly evidence-based assessment tasks using digital tools such as e-portfolios, learner-generated video and web-conferencing, especially in workplace settings.
- ▶ Provide clear guidelines and solutions to implement and evaluate a national learner-centered approach to blended learning.
- ▶ Expand institute-level support and scaffolding services to assist trainers to access quality digital learning materials, re-purpose exemplar unit and course designs, and rework generic session plans to embed quality practices in live online classes.
- ▶ Ensure that all TVET providers have the skills and resources to support, facilitate, and monitor the outcomes of a blended approach to skills development, and that individuals can develop the appropriate skills and attitudes, to engage in this new teaching and learning experience.

Digitalizing access strategies

- ▶ Inform the offer of digitalized training products and services with comprehensive studies of the targeted groups or population capabilities (infrastructure, equipment, and connectivity), as well as skills and attitudes, to ensure access and uptake of such opportunities.
- ▶ When adopting flexible and blended learning approaches, embed robust no or low-tech alternatives at the programme design stage, to avoid further disadvantage for those who face barriers related to infrastructure and/or equipment.
- ▶ Provide guidelines, regulations, and frameworks for the integration of broadband and connectivity services in TVET institutes to ensure the impact on access and equity is considered and measures are taken to address it.
- ▶ Review inter-agency referral and outreach systems and identify digital opportunities to streamline, extend and enhance communication options for information and advice services.
- ▶ To avoid further marginalization of people with disabilities, if the decision is made to introduce digitalized training products and services, include assistive technologies in all digitalization strategies and IT procurement policies and provide awareness and operational training in using the technologies in pre-service and in-service programmes.
- ▶ Consider using technologies to put in place, expand, or strengthen Recognition of Prior Learning (RPL) mechanisms, to recognize skills acquired through informal, non-formal or formal learning and to assist users to participate and complete the process.
- ▶ Make the best of data that can be retrieved in all the systems in place to make informed decisions and continuously improve content, process and the organization.

- Maximize the use of technologies to ensure the integration of career guidance and employment functionalities in the skills development lifecycle, to provide adapted counselling before training happens, and link the recently graduated learners to potential employment, traineeship or apprenticeship opportunities.
- Provide guidance to equip learners with devices they can use (even offline) to ensure the continuity of the learning experience outside of the classroom – whether it be for research and homework purposes, or self-paced learning activities.
- Provide support to teachers and learners to maximize engagement and adoption of the new learning ecosystem, pedagogical approaches and all sorts of technologies and devices they will be using.

Digitalizing employability strategies

- Support quality career and employment service networks with open digital access to all key information, decision tools and communication options, including providing personalized dashboards to provide access to real time labour market information.
- Strengthen local tripartite collaboration between government ministries, employers and workers' organizations, as well as with the private sector, to ensure skills development opportunities (supply) match the required and needed skills (demand) in the Labour Market.
- Implement e-portfolio tools and systems to provide learner-managed portable evidence of competencies, experience and qualifications to link workplace and institute training outcomes and to empower employability service advisors.
- Develop comprehensive digital career guidance platforms with multi-channelling and associate career development support to high quality digital training platforms offering core and technical skills course.
- Ensure an appropriate regulatory base and technological framework to support the development of digital credentials that reflect granular skills and knowledge development, to support skills matching as well as ownership and portability of individual skills information.
- Review emerging digital applications which support partnership and collaboration between employers and training providers, and extend the role of providers beyond the duration of courses to include providing ongoing learning and improving employability.
- Use competency-based training and assessment to provide clear and measurable training outcomes to meet employment demand and increase job readiness of graduates and deliver performance improvement for employers.
- Provide focused development of nationally identified employability skills by contextualizing those skills to the jobs and industry within courses, as well as providing stand-alone short courses and resources in a variety of appropriate formats.
- Make sure to take a user-centric approach to online or hybrid career guidance tools, and support individuals with the use and uptake of such online counselling services.

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